STATUS OF METRIC CONVERSION IN THE U.S. AND OVERSIGHT OF U.S. METRIC BOARD

HEARING

BEFORE THE

SUBCOMMITTEE ON
SCIENCE, RESEARCH AND TECHNOLOGY

OF THE

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STATUS OF METRIC CONVERSION IN THE UNITED STATES AND OVERSIGHT OF U.S. METRIC BOARD

MONDAY, FEBRUARY 8, 1982

House of Representatives,
Committee on Science and Technology,
Subcommittee on Science, Research, and Technology,
Washington, D.C.

The subcommittee met, pursuant to call, at 9:30 a.m., in room 2318, Rayburn House Office Building, Hon. Doug Walgren (chairman of the subcommittee) presiding.

Mr. Walgren. We will call the meeting to order.

I want to welcome you here today and apologize for starting this hearing somewhat late. There are, it seems, so many problems which cause that to happen.

Our hearing today deals with a subject with which the Committee on Science and Technology has been involved almost since its establishment in 1958.

In 1968, the Congress, after extensive consideration, passed the Metric Study Act. This led to the submission 3 years later of the National Bureau of Standards' report, "A Metric America—A Decision Whose Time Has Come."

In 1975 the Congress passed the Metric Conversion Act which, with President Ford's signature, established the U.S. Metric Board. After a lapse of more than a year, President Carter nominated the 17 members of the Board early in 1977 in his administration, and gave his personal support to the concept of voluntary metric conversion.

Since then our committee has followed the progress of metric conversion in this country and around the world. Most recently this subcommittee, under its distinguished former chairman, George Brown, held oversight hearings in November 1979.

Today's hearing is aimed at obtaining information about two closely related questions: First, what is the status and trends of metric conversion in the United States, and, second, how successful to date has the U.S. Metric Board been in carrying out the statutory functions assigned to it under the 1975 law.

Behind these questions are several important issues. To what extent will the country soon be faced with a dual system of weights and measures, if that should be the case? And what will the effects of that be on our productivity and rate of technological innovation? What will the effects of such a dual system be in our schools, or for the consumer in his or her trip to the supermarket? What will be the effects on our international competitive situation and our international trade position?

Some have argued that the Metric Act should be abolished and others have concluded that the act should be substantially amended to accelerate metric conversion in this area and to strengthen the Board's mandate.

President Carter, in his last budget message, recommended a 50 percent increase in the Metric Board's budget. In March of last year President Reagan, after a thorough review of the entire Federal budget, recommended a 20 percent increase for the Board. However, the President's cuts last September included a recommendation that all funds for the Metric Board be deleted and that the functions be transferred to the Commerce Department.

The Congress did not accept that recommendation and, in part through the efforts of Congressman Don Fuqua, the chairman of the full Science and Technology Committee, the funds were restored for fiscal year 1982.

In the context of these past developments, I look forward to the presentations by today's witnesses, who have agreed to give us the benefit of their experiences and views in this important matter.

The first witness is Senator Claiborne Pell, U.S. Senator from Rhode Island.

Senator Pell has had an interest in this matter for some time and I particularly appreciate him coming this morning to join in this review with us. We hope to create a record that will both continue the discussion and hopefully result in support for a policy and a course that will be in the best interests of the country in this area. It is my honor to chair these hearings and try to create the record that would then be available for review by the other members. It is a great honor to have Senator Pell come and join with us.

Senator Pell, we appreciate your being here.

STATEMENT OF THE HONORABLE CLAIBORNE PELL, A U.S. SENATOR FROM THE STATE OF RHODE ISLAND

Senator **Pell**. Thank you very, very much, Mr. Chairman, for giving me this opportunity to be with you and our colleagues in the Congress.

Despite its appeal to simplicity and logic, metrics today remains an issue that is cloaked in misinformation and popular misconceptions, almost mythology. Here I am reminded of the business executive who received a questionnaire in the mail asking for his views on metrication. Not being an expert on the subject, he called in two of his senior vice presidents and asked them about it, asked if they had any opinons on metrication. One of them had none and the other replied, "I guess it is all right as long as it is done by consenting adults."

But as a general rule, people are very mystified at what we are talking about. That story says a great deal about what should be done in converting to the metric system. Now, the death notice is about to go out for the only Government agency that serves as an information clearinghouse for voluntary conversion: the U.S. Metric Board.

I hope your hearing, Mr. Chairman, will not be a wake for the Metric Board or for the Government's role in assisting conversion. Instead, I would hope this hearing might produce an impetus for rethinking the proper role of Government in this process, one which could be of great benefit to our economy if properly planned and executed.

Our major competitors have long since undergone conversion and reap the benefits today of a preferred position in marketing their metric-measured products. Our large international industries, like the machine tool industry in my State, live in a constantly divided world of measurement, operating under a kind of constant language barrier in doing business with the rest of the industrialized world.

Of course, our industries where international trade is dominant, like pharmaceuticals and photographic equipment, have already gone through the conversion process, painlessly and without experiencing the kind of runaway costs often cited by opponents of conversion. Many other industries have finally realized the importance of conversion to their trade position.

The automotive industry, for instance, is rapidly undergoing conversion and General Motors, which has thousands of suppliers throughout the country, will be 100 percent metric by 1983. They have recognized that in the age of the world car—produced, sold, driven and serviced in dozens of nations—use of a uniform world standard of measurement is not only good business, it is essential.

What we forget today is that only we and four very obscure tiny countries are presently not on the metric system. Our own industrialists, when they manufacture a product, have to manufacture two lines, one for sale in our own country using the ancient English system, and one in the world system of metrics. If we had one sytem of measurement, we could save ourselves a great deal of money.

The original impetus for the creation of the Board, for going metric, came out of the idea of the economic benefit, cost-benefit ratio that would result if we went metric. And the early studies in this regard have continued to hold up pretty well.

Consumers today may not like metrics but live in a world in which the process of conversion increasingly appears in their everyday lives. Dozens of consumer products like skis, cigarettes, and beverages are metric, and many grocery products are now labeled in both metric and customary measurements. Over 20 percent of the gasoline stations are now selling by the liter.

What all of this suggests is the need for constructive help to the consumers, unions, and businesses living increasingly in a world of meters and kilograms. To my mind, this is certainly not the time to eliminate the only agency that provides the technical assistance and planning that minimizes the actual costs of conversion and helps the consumer to better understand the changes in measurement going on around him.

The English have had the good sense to leave the English and move toward the metric, the Canadians are doing the same; surely we should do the same.

When the Metric Board was created 6 years ago, I personally would have much preferred to have given the Board a positive mandate to encourage and advocate conversion, and an actual date. I continue to believe that strong national leadership in the direction of conversion would strengthen our trade relationships and make a course which is inevitably much easier for the consumer.

Despite its limited mandate, the Metric Board has carved out an important role in public education as a source of continuing the debate on metric policy and, most importantly, as a planning link between the consumer, the worker, and business and industry. Already the Board has initiated 14 different studies on the status of conversion in our various leading industries, as well as the problems and costs. If the Board is disbanded, this important work will be lost and the country will regress entirely to the haphazard way we approached metric conversion for nearly 200 years.

My hope, Mr. Chairman, is a simple one. In my judgment, we cannot as a nation afford to continue drifting aimlessly toward the world of metrics and in a world of metrics without some form of national planning to assist the conversion process in industry and guide our trade relationships. It is premature to write the obituary for the Metric Board, and I urge your committee to give this tiny agency a stay of execution. In the meantime, let us as a nation continue the dialog on the metric issue, and commit ourselves as a people to a long metric stride toward the future, and toward getting in step with the rest of the world, including the rest of the world in our own hemisphere.

Mr. WALGREN. Thank you very much, Senator Pell.

You indicate in your statement that you would have liked to see us have a target date for the adoption of the metric system in the United States. Can you look back on what we have not done in your view these last several years and suggest where we might be if we had had a target date? Or what do you see a target date doing for us now?

Senator PELL. What I see a target date doing is keeping the pressure on to move down this road. I think what we did was very poor in the way of public relations.

For instance, before the public was ready for it, we started putting signs in the roads where people were disconcerted by that. Far more fundamental was to get their industrial products moving down the road of metrication. This I think would have been speeded up if they knew that by the year 1990, 2000, it had to be done.

This is what they did in Great Britain. You find that because they had definite policy of converting, they moved evenly and they found the cost of conversion was far less than they expected.

Along this same line, I regret to say that one of the measures that was helping was the so-called metric education bill which we had in a single program under the Education Department, and that has been eliminated by the administration and rolled into a block grant, leaving it to the individual States, if they wish to spend a little money on metric education but, as we all know, very little money will be spent on that.

This program, doing a good job in all the States, is now down the drain, making it all the more important, with the absence of metric education program now, absolutely washed out, that this little agency continue to survive.

Mr. **Walgren**. Why do you think we got going down the highwaysign road? I remember being struck by that when I first came to Congress. The fact was that given its value or the added benefit of the sign being in one form or another, you just could not at that point, where you were denying funds to so many very constructive efforts, you just could not give that the priority, at least I personally could not.

Was that a mistake that we should have avoided?

Senator **Pell**. I think it was a dreadful public relations error. That should have been the last step on the road to metrication, not the first. But because it seemed simple, it was done first. I believe it was simply an error in judgment, looking back on it.

Mr. **Walgren**. If the Metric Board is defunded, as apparently the Reagan administration would like to see this year, what sort of direct and then longer term effects do you see if we really just stop that effort?

Senator **Pell**. We are going to go metric anyway; it would be a question of whether it would be 20 years from now or 15 years from now or 30 or 40 years from now. In the meantime, what worries me is all the trade, the additional money that will have been spent in producing two lines of goods and the loss to the American manufacturer, the American economy, being as a result of delaying going down an inevitable road.

Mr. **Walgren**. So it is primarily a cost saver in your view?

Senator **Pell**. In the long haul it is a cost saver.

Then comes the question of who will bear the cost of conversion. In general I think the cost of conversion should rest with the industries themselves. You will find that it is not as bad as they estimate it is, particularly if they have a little time and if you have a fixed date, they will know how much time there is, when they will buy a machine in metric terms and when to buy one in English terms.

You hear many, many figures bandied around, I do not want to bandy one more, but it goes into the many millions of dollars by which the United States would benefit if we would move along this process in an orderly way.

Mr. **Walgren**. And what do you hear of the Canadian experience at this point? They apparently have gone down this road a little bit ahead of us. Are there important lessons to be learned from them in your view?

Senator **Pell**. I have not followed the Canadian experience as closely as I should. I know more about the English experience. There the thing is working out fairly well. I know quite well the man who was in charge of it for a while. It is working out there.

Mr. **Walgren**. We will hear later from the representatives of the Board itself, and I am sure that they will be able to give us some indication of their specific experience.

Senator **Pell**. I would add, Mr. Chairman, if I could, that the Board has done a good job, under a very difficult mandate, and a very difficult set of instructions, because they are not supposed to recommend either going or not going; I think, considering the money that has been spent on them, they have done a first-class job.

Mr. **Walgren**. Is that an untenable position to put them in, the constraint against advocating?

It seems there is some confusion about whether they are advocating, whether they are prohibited from advocating. What crosses that line?

Senator **Pell**. It is part of the messy democratic process but it apparently worked and they have done a pretty effective job in moving down these studies without having a preconceived official position. That, as I understand it, is the mandate we gave them.

Mr. **Walgren**. Do you feel that efforts toward metric could cause great dislocation in our economy, even on a small scale, village by village or town by town? How do you assess that?

Senator **Pell**. Absolutely not. We have seen how certain industries, pharmaceutical, photographic industry, have already gone metric with no problem at all. As long as there is a timetable, it should work to the benefit of industry.

I am reminded here of the experience I had with the leading machine tool manufacturer in my State, Brown & Sharpe; they were violently opposed to metrication in the beginning. Then suddenly they realized that if there was metrication they would have to have more machine tools with different measurements and they suddenly became enthusiastic advocates of it.

I think basically our job is to show people where their economic interests lie, as a general rule the economic interests of the American people, business, citizens, rests with going metric, not in a year or 5 years or 3 years, but having a target date of maybe 15 years, 10 years from now.

Mr. **Walgren**. Well, thank you very much, Senator. I understand you have a commitment at 10 o'clock, which is the hour that is upon us now. I appreciate very much your interest in this area. As we go forward with it, perhaps we can reach out to you and get other perspectives you might have.

Senator **Pell**. I thank you very much and I want to be of whatever help we can be and share with you a deep interest in this whole subject.

Thank you, Mr. Chairman.

Mr. **Walgren**. Thank you very much.

We also have today two Members of Congress who have been particularly interested in this bill. I would like to invite them both to come to the table and to join with us, to the extent they have time available, to hear any of the witnesses and add what perspectives they might have.

I appreciate your interest in this area very much and feel that it is essential if we in the Congress are to find the right track.

First is the Honorable Eldon Rudd, who is a Representative from the State of Arizona. Mr. Rudd has long had an interest in this question.

The second is the Honorable Robert McClory, who is a Representative from the State of Illinois here in the House.

There are other Congressmen from those States to be sure, but these gentlemen are among the most distinguished of those delegations.

I would like to ask first Congressman Rudd to proceed and then we will turn to Mr. McClory.

STATEMENT OF THE HONORABLE ELDON RUDD, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF ARIZONA

Mr. RUDD. Thank you very much, Mr. Chairman.

I am most appreciative of the opportunity to be here with you today for several reasons. I thank you for that opportunity. I have great empathy with this committee, having served on the committee my first term in Congress. I understand the tremendous importance of the work of the committee.

Our Nation was blessed when the committee was established in the first place. As a matter of fact it was largely the work of the first chairman of this committee and the committee itself that helped us put a man on the Moon and do some of the really wonderful and exciting things that have happened to our Nation in the past two decades.

With regard to this particular subject, I would like to tell you that I am not opposed to metrication as such. I am only opposed to it being imposed upon our people, our Nation, by imperial decree and legislative effort—against their will, of course. The people of this country are still the Government and they still rule, we hope. I sincerely believe that they do, for our Constitution provides for that.

With regard to the imposition of metric, I have submitted a statement to you, and with your indulgence and permission, I would like to submit that statement for the record, together with the appendix referring to the items within the statement.

I will try to summarize what I feel with regard to the subject and then, at your disposal, be available for whatever else needs to be done.

Mr. WALGREN. Any submission either of you would like to make will be made part of the record. So please proceed as you feel most effective.

Mr. RUDD. I have gone into some detail in my statement with regard to why the SI metric system should not be imposed upon the people in a mandatory way. Also, the findings which are included in the bill, H.R. 1660, which is before this committee, and has languished in this committee for about 5 years. I hope one day we will have some hearings on that bill because I think the people deserve to have an opportunity for debate and discussion on the matter.

The findings that I have set forth do include that the vast majority of the American people are strongly against conversion in a mandatory way and the Metric Conversion Act conveyed to the American public and the business community an erroneous impression that conversion was mandatory. That has been played upon; no free country in the world has ever gone voluntarily to metric. It always has been imposed by imperial decree. In this light, the Metric Board does exist as an unnecessary promotional vehicle and uses Government—funds, funds of the taxpayers—to promote and establish its influence.

The ad hoc Interagency Committee on Metric Policy was established—and it apparently is not answerable to either the Congress or the Metric Board—and has, through the reputation that it has acquired in the various Government agencies and the promulgation it has made in the Federal Registry, indicated by actions, at least, that metric conversion is mandatory and not voluntary as the act expressly states.

The GAO study—the General Accounting Office report of 1978—established a number of items indicating that metrication was on the wrong track with regard to the way in which it was set forth and the actions that were taken. It cited what has become known as the inevitability syndrome, indicating that metric is going to take place regardless of what happens, that it is just a matter of time, and that it is inevitable and it just is going to happen.

The GAO study, quite a lengthy study, indicated that the Metric Board did not really inform the American people that conversion was voluntary, as it was supposed to do, and that its policies did not advocate or discourage as it was supposed to do but really advocated metrication.

I might say that the Board itself, through its executive director, in various actions indicated—most of the Board is made up of prometric people—that it was an inevitable thing, and I think the executive director on one occasion indicated that the public should be sold on this idea before they discovered the inconvenience of the usages of metric.

The Interagency Committee on Metric Policy did, as I pointed out, in the Federal Registry indicate a promulgation by rules and regulations that there was a time factor when metrication should take place.

I wrote letters to the heads of all of the Government agencies and the reason I did, on occasion, was that the Metric Board had put out news releases that indicated that metrication was going to take place. I received responses from almost every one of these people with varying degrees—they are summarized in my statement—of acceptance or nonacceptance, agreement or nonagreement, with whether metrication should take place. Generally speaking, they were not aware that there was a time factor involved when metrication should occur.

But some of them, regardless of whether or not they felt that it would occur, set policies of their own that they would institute metrication totally within say, 10 years. The point being that the Board did this despite private sector opposition and with no authority from Congress to convert.

Another ad hoc committee which was established was the Metrication Operation Committee, whose purpose, apparently—encouraged by the Interagency Committee—was to identify the individuals and all of Federal agencies who were presumably knowledgeable in metrication. These individuals were advocates of metrication so this would be a benefit in promoting metric and establishing SI metric as our system of weights and measurements in this country. They wanted knowledgeable personnel within 183 Federal agencies—and when this was established and promulgated, there was no indication or reference to voluntary conversion, but again it related to using the so-called inevitability syndrome. The Board desired to publish against the opposition, and omit the congressional intent of the voluntary nature of metrication, established by the law.

The American National Metric Council, which does better than any other agency in the country in my opinion, makes the effort to acquaint the public with the processes of metrication. Of course, it is prometric, but they do the same job that the Board was intended to do. They will educate the public or anybody that is interested in the voluntary nature of how to use the metric system.

By the way, the metric system we are talking about is the Systemé Internationale, established for our country, was agreed on for our country in 1963. It is not the same system that is used in other metric countries in the world.

The ANMC brought a plan out recently to convert the chemical and instruments industries and the Board endorsed that plan, despite its recognized adverse effects on the industries. These were mentioned by the Board itself.

I have to believe the reason that they endorsed it, after a 2-hour hearing, was to provide some concrete or tangible accomplishment on behalf of the Board to the Congress and the administration to prove their worth. At least this is what it indicated to me.

The testimony of one member of the ANMC in that case, Mr. Verna, apparently made a mistake in his statement which indicated that 43 trillion rates of transportation prices would be affected, and in his oral statement, he indicated there were 3 trillion rather than 43 trillion. But a trillion is an incomprehensible amount in numbers by any standard.

This indicates the complexities and difficulties involved in metrication. In one industry which did not want it, the people in the industry were bitterly opposed to this plan to impose metrication on those industries and called it disastrous. The changeover industries gaged by standard liquids and linear measurement would cause confusion and difficulty to understand the system; they said the farmers, for example, would under no circumstances attempt to learn metric for that purpose.

Most metrication advocates indicate that the compelling argument in favor of the metrication is the benefit for world trade. To ascertain this, the GAO report that I previously cited—a most complete report—concluded it would cost billions of dollars to switch to metric; that there was no evidence there would be improvement for the sole use of the metric system; that the dual standard had been in effect and had been very successful; and the so-called standardization was already in effect by our American system of measurement and that standardization by metric in view of the different systems of metric in use would be very difficult and expensive.

A case study of the beverage industry indicated that when it commenced the use of the metric system it cost 11 percent more for consumers than it had previously in order to do that.

The GAO study also shows many other sectors of the economy could show no benefit from going strictly to metric.

In my statement there is a cost chart drawn up which will indicate in a brief way what the immense cost of going metric would be.

With regard to world trade, we mentioned Canada. Canada has been attempting to impose metrication Province-by-Province and has caused revolts even though Canadian authorities have threatened fines and imprisonment to insure this. The same thing happened in Australia and New Zealand. In New Zealand they did away with the Metric Board some time ago.

With regard to what is going on in Britain—the attempt to establish the metric system in Britain—there also has been great difficulty here in the metrication process.

The democratic nations of the world have resisted this rule by imperial imposition or decree. The fallacy that 90 percent of the world is metric is just that, a fallacy. Every one of the compulsory metric nations use, in specifications and sometimes to a greater degree than the others, about 16 metric measurement systems that are in use around the world.

In 1979, of the 152 members of the nations in the U.N., only 44 or 29 percent ascribe to metric. Another fallacy that every nation is using metric—and it was imposed by imperial decree—is that where it did successfully take place, the literacy rate was very, very low and population of the country was small at the time of imposition.

So I asked myself, and I asked this committee: Why, indeed, should the United States—with our highest educational standards of any country in the world, highest scientific achievements using the dual system—forsake success and impose SI metric to achieve a success which we already have?

The alleged use of the SI metric system by scientists may be true, but not to the extent that most people would indicate who ascribe to metric. In any case, most of us are not scientists and would not need this system anyway.

It is difficult to explain the SI system, which is based on force rather than weight and also the different systems using the wave length version. I have set forth explanations in my statement with regard to this. It would be difficult, for example, to tell your friends the weight of your baby in so many Newtons rather than in so many pounds and ounces.

Metric was imposed in France where this system, the general metric system, originated, during a reign of terror imposed by Napoleon on countries he conquered. Of course, when he disappeared from the scene, many of these countries faded away from the use of metric.

The California Metric Council recommend its own abolishment last year until the people themselves indicate a need or use for the system.

I believe we have not been served well by the Metric Board. Should we impose the metric system on our people against their will, in effect, it would indicate that the control over our weights and measures would go by the Government of France rather than by the Congress of the United States as our Constitution provides. I do not think the metric system is needed.

The proponents of the system percentagewise have fallen off from what they were originally, which was about 24 percent in 1979. It is impossible to mandate this system over 229 million people who are so well established and served by the customary American system, which has succeeded very well for us. It is as much a part of our heritage, our society as the English language, which is the language of our Constitution.

Cost estimates for metrication vary in the billions of dollars. One study indicated $100 billion, another almost $200 billion. The inconveniences and headaches it causes to every American are other reasons why it should not be imposed.

The Metric Board has really accomplished nothing along the lines it was supposed to accomplish. It has created irritation, even anger, and I think it should be abolished outright.

Thank you.

[The prepared statement of Mr. Rudd follows:]

STATEMENT OF
HONORABLE ELDON RUDD
FEBRUARY 8, 1982
HOUSE SUBCOMMITTEE ON
SCIENCE, RESEARCH AND TECHNOLOGY

Mr. Chairman, I am grateful to have this opportunity to speak on the subject of metric conversion in our Nation -- a nation which prides itself on government by the people, for the people, and serving the wishes of the people for which it stands.

I start with these words because it is my strong belief that the people of this Nation have not been well served, nor properly informed, by the agency we created to assist the public and private sectors on the issues relative to our Nation's policy on weights and measurements usage.

The U.S. Metric Board, as I see it, has not conformed to the intent and spirit of the 1975 Metric Conversion Act, and in my judgement, the Board in fact has done more to confuse the American people -- and our various government entities -- than objectively educate them as the law demands. American industry, labor, educators and citizens know even less about our national policy on metric usage. I think it is fair to conclude that the people and the institutions that represent our citizenry are in greater disarray on the meaning of our national policy than ever before, as I will later demonstrate in my statement.

At this juncture, I want to emphasize that I am not against the usage of SI metric in our Country, for Congress authorized the voluntary use of either metric or our customary system of weights and measures as far back as 1866. However, I strongly oppose Federal bureaucratic promotion and imposition of metric conversion upon the American people or our private sector -- something that was never authorized or endorsed by Congress.

The ultimate question for the Members of this Subcommittee is: Why do the American people need to continue supporting the U.S. Metric Board -- and its ad hoc Government supporting agencies and subcommittees -- which aim to impose the SI (international system of units -- metric-based) upon our Nation?

The following is a listing of the findings included in a bill (H.R. 1660) I have sponsored to repeal the 1975 Metric Conversion Act and abolish the U.S. Metric Board, the latter action endorsed by the Reagan Administration. These findings include --

(1) the vast majority of the American people are strongly against conversion from customary United States weights and measures to the metric system;

(2) the Metric Conversion Act has conveyed to the American public and to the business community the erroneous impression that United States conversion to the metric system is national policy, which it is not;

(3) no free country in the world has converted its economy to the International system of units (SI), the wavelength-based (see Appendix J for explanation) metric system adopted by the General Conference of Weights and Measures in 1960 and cited as the optional system of metric measurement in the Metric Conversion Act of 1975;

(4) the U.S. Metric Board exists as an unnecessary promotional vehicle within the United States Federal Government, using

the resources and power of the Government to influence and encourage conversion to the metric system throughout the United States in violation of the intent of Congress;

(5) Federal bureaucratic imposition of metric conversion has been fostered by the United States Metric Board's ad hoc Interagency Committee on Metric Policy (ICMP), which has promulgated Federal metric policy and guidelines (Federal Register, January 8, 1980), instructing all Federal agencies to implement increasing metric usage through Government procurement, constracting, and other policy initiatives in violation of the intent of Congress;

(6) several Federal departments and agencies have provoked widespread public opposition by attempting to impose use of metric measurement on highway signs, in weather reporting, in marketing beverages and other products, and through school curriculum materials, also not in keeping with the intent of Congress that use of metric measurement by any sector in the United States be strictly voluntary, as provided under the 1866 statute, and not imposed by the Federal Government;

(7) according to an exhaustive study by the Comptroller General of the United States, the cost and disruption of metric conversion to the American people would be enormous, while the purported benefits of such conversion are nonexistent or questionable in practically every area, including potential world trade market advantages;

(8) standardization and rationalization of measurements, and other purported benefits ascribed to metric measurement, have occurred throughout the world under the customary system without metric conversion;

(9) there is no evidence that a solely metric system would be better for the United States economy, and the United States economic activity and world trade have not been hampered or injured by a dual system of customary and metric measurement according to the Comptroller General's report;

(10) the U.S. Metric Board has failed to assist the public to become familiar with the meaning and applicability of metric measures in daily life, and has failed to coordinate metric conversion initiated in the private sector involving private industry and the Federal Government, two of its three responsibilities required by law;

(11) it is in the interests of the United States to eliminate Federal government entities or programs, such as those continuing and expanding beyond the intent of Congress under the Metric Conversion Act of 1975, when it is clear that such entities or programs are detrimental or unnecessary to public need.

*** Legislative History Behind the 1975 Law ***

Before I go any further, let me examine the legislative history of the Metric Conversion Act of 1975. In brief, it states --

> "An Act to declare a national policy of coordinating the increasing use of the metric system in the United States, and to establish a United States Metric Board to coordinate the voluntary conversion to the metric system."

While the very name of this law, "Metric Conversion Act," implies a certain inevitability to conversion, there is substantial evidence to the contrary. In fact, during the original debate on the language of this Act in 1975 in this same Subcommittee, there was heated discussion over whether or not to use the wording, "to convert to the metric system," as opposed to the declaration of a national policy to "coordinate increasing use of the metric system." As stated in a Congressional Reserach Service (CRS) background report issued on August 31, 1978:

> "The latter policy suggests coordination of usage rather than conversion to a new system. As a policy, coordination of usage of the metric system could mean continued use of a dual system of measurement in which the present system might predominate."

Said then-Subcommittee Chairman Symington: "In fact, one of the reasons for changing the title of the bill is to place the chief emphasis on the voluntary nature of the adoption of the metric system."

Unlike other metrication measures proposed at the time, the bill that passed differed in the role our governmental bodies would undertake in increasing metric usage. Specifically, Congress rejected outright any timetables or timeframes for conversion. In addition, Congress ruled out any mandatory implications to metric conversion. In adopting the compromise measure, Congress placed a greater responsibility on the private sector for initiating metric conversion. Added the CRS report --

> "Although the legislation included a Metric Conversion Board, the Board was not intended to play a pro-metric role. Its function would be more neutral in that it would assist in advising and coordinating those sectors interested in converting, without maintaining any compulsory powers."

Chairman Symington, in response to concerns by small businesses and labor, made the following statement:

> "The Metric Board has an obligation under this bill to study the harmful effects that any metric move made in this country could have on any element of society, and of course none more importantly than the working people who own their own tools."

In summation, the following key points need to be emphasized:

(1) Key words in the Act are "coordinate" and "voluntary." It is not the policy of our Nation to impose or create timed programs of conversion. There are no compulsory elements in the legislation.

(2) The legislative history of the Act acknowledged the lead role of industry in conversion to metric, if such a conversion is desired.

(3) The Board will not advocate metric usage over our present system of customary measurements. Objectivity is required.

*** U.S. Metric Board in Practice ***

When the United States Metric Board was finally established in 1978, it was assumed the above prerequisites would be followed in carrying out its legitimate functions. It would serve as a focal point for information and objective analysis requested by the public and private sector.

Shortly after the 17-member Board became operational, it became clear that the new agency's members were intent upon violating the spirit of the 1975 law. The Board has taken a strong pro-metric advocacy position in all its actions, thus violating the Congressional intent. During the 1979 Oversight hearings in this same Subcommittee, I cited numerous examples of this distortion of the 1975 law.

The Board's executive director at the time, Malcolm O'Hagan, gave a blatant example of the Board's pro-metric stance and misrepresented our national policy in a speech to the Council of Engineering and Scientific Society Executives. In this speech, he states --

> "(W)e are placing special emphasis on public education and information. To those who understand the metric system, the advantages are clear. Opposition to the conversion, can, however, develop if Americans are not aware of the advantages before they encounter the small but noticeable inconveniences... We hope to create a climate for the acceptance of the metric system."

In the 1978 General Accounting Office study, the Comptroller General specifically addressed the problems of misinformation on our national policy in his recommendations to the U.S. Metric Board, namely:[1]

--Inform the American people that conversion is strictly voluntary and that our national policy does not favor the metric system over the customary system, or vice versa.

--Ensure that its policies do not advocate or discourage the use of one system over the other.

--Citing the "inevitability syndrome," a belief shared by a majority of responding businesses and groups, the report urged that it be stressed to industry that conversion is voluntary.

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[1] See Appendix I for summarized GAO report.

Despite these recommendations, the Board has continued to operate in a manner which actively promotes, encourages, and even imposes the use of metric measurement upon the public and private sectors. For instance, the Metric Board's ad hoc Interagency Committee on Metric Policy (ICMP), composed of agency representatives, has continually taken bureaucratic initiatives in metric conversion ahead of the private sector.

The goals and objectives of the U.S. Metric Board and its ICMP become glaringly apparent when one reads the ICMP's "Federal Metric Policy and Guidelines; Notification of Metric Conversion Policy for Federal Agencies and Federal Agency Guidelines for Implementation of Metric Conversion Policy," printed in the April 30, 1981 Federal Register. The "rules" published in the Federal Register provide insight into our bureaucracy's interpretation of the word "voluntary" as stated in the 1975 law. Recognizing the fact that private industry does not share the same enthusiasm for mandated metric conversion, the ICMP stated in its "Metrication Conversion Policy for Federal Agencies" --

> "A comment suggested that 'consistent with voluntary conversion in the private sector' be added at the end of the sentence. The ICMP adopted "with consideration of" instead of 'consistent with' but otherwise accepted the wording. The ICMP felt that 'consistent with' could service to limit initiatives toward metrication even when they appear to be in national interest..."

> "...A comment also suggested that 'coordinating' be inserted before 'the increased use of the metric system.' The ICMP adopted 'dealing with' since it was felt that 'coordinating' is a limiting term."

In the above two instances, the ICMP sought to ignore the clear expression of Congress to place the private sector in the lead role of deciding when, or if, metric conversion should take place. There are numerous other examples of bureaucratic arrogance and revision of national policy, including the following sentence in the ICMP Policy Statement: "Federal agencies shall encourage and support an environment which can accommodate metrication and when taking initiatives, will act with consideration for metrication in the state and local governments and the private sector."

*** Rudd Letter to Federal Agencies ***

In an effort to determine the consistency of our national policy on metrication, I wrote to the head of every major Federal agency. My letters were prompted by a press release issued by the U.S. Metric Board that said that most ICMP participants have agreed to Metric Board guidelines for converting to metric the measurement units in the respective news releases of each agency. Attached to this statement are copies of the U.S. Metric Board press release and a sample of my letter that was sent to 27 Federal agencies.[2]

The 21 responses I received should give you an indication of how confused our Federal bureaucracy is on the direction of our national policy on weights and measures. For an example of this inconsistent interpretation of the law, let me quote a few of the responses:[3]

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[2] See appendices F and G

From the Department of Commerce --

"We have been generally supportive of the activities of the U.S. Metric Board's Interagency Committee on Metirc Policy (ICMP). The goal of the Department is to convert all appropriate activities to metric usage by 1985. Metric conversion costs are handled as normal operating expenses within existing budget limitations."

From the Department of Interior --

"We inquired into your specific concern over the metric issue, and we share your understanding of the law. Conversion to the metric system is to be voluntary. Since Congress has not instructed Federal agencies to mandate conversions, initiatives will primarily come from the private sector."

From the U.S. Small Business Administration --

"Please be assured that we share your concern wherever the recommendations and actions of the Metric Board or any of its subcommittees offers a potential adverse impact on the small business community."

From the Office of Technology Assessment --

"You are, of course, correct that present law imposes no deadline for the conversion to metric by Government agencies...We have no present plans to require metric equivalents in our final publsihed products."

From the Postmaster General --

"Conversion to metric weights and measures by the Postal Service would for the most part have to follow a general movement in this direction by our customers. At this point, there is no evidence of such a movement."

It is apparent that many of our Federal agencies are approaching the subject of metric conversion gingerly, while still others, like the Defense Department, make no secret out of the fact that it will convert completely to metric by 1990.

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[3] See Appendix H for complete set of responses.

Some of the other Federal metrication activities include:

--The United States Geological Survey, the Nation's principal mapping agency, has started making a series of metric maps as part of a long-range plan to convert completely to the metric system.

--The Departments of Commerce, Energy, Transportation, Defense, Interior, Health and Human Services, Agriculture among others, have all pushed forward in their ICMP-initiated metrication projects, indifferent to the lack of public support.

--The Water and Power Resources Service is conducting dramatic changes in the awarding of Government contracts for design and construction activities. So far, over $300 million worth of federal contracts have been ordered to be handed out to firms employing metrics.

The most important point here is that all of these activities have been initiated by the Board with the full knowledge that there has been little, if any, push by the private sector towards metric usage. Congress never authorized any Federal agency to begin converting to metric; if Congress did, we certainly would have stated it that way in P.L. 94-168, the 1975 law establishing the U.S. Metric Board.

Recently, an even more obscure decision-making body within our "metrication" infrastructure, the ICMP Metrication Operation Committee (MOC) prepared a lengthy document called the Federal Metric Information Referral Directory, dated November 2, 1981, which purports to list the names, addresses, and telephone numbers of Federal agency personnel who are "knowledgeable about the status of metrication within major areas of Federal responsibility." The memorandums between the MOC Chairman, Howard B. Ellsworth, and the U.S. Metric Board are attached to this statement.[4] The draft of this extensive list contains the names of 183 Federal agency contacts in 136 different "Pre-eminent Areas" of Federal responsibility on metrication activities.

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[4] See Appendix E.

The Introduction to the Directory makes no reference to our National policy on the "voluntary" aspect of metric conversion, nor does it mention private industry's lead role in this process. In fact, the language in this document is blatantly misleading in its interpretation of the Federal role, particularly as it relates to the "inevitability syndrome."

For instance, here is how the MOC describes the responsibilities of each agency representative in these "Pre-eminent Areas":

> "Usually there are people in these programs who are in touch with the status of metric conversion as it affects their program areas. They may know, for instance, that no activity is occurring, which, in itself, can be useful information. They also usually know the issues that metric conversion is encountering as the changeover occurs."

The above language displays a gross insensitivity to legislative background and key elements of the 1975 law. Thomas A. Hannigan, the labor representative on the U.S. Metric Board, stated his objections on the Directory in a letter to the MOC on December 18, 1981 (letter attached to statement). Hannigan wrote:[5]

> "The Federal Metric Information Referral Directory is a list of people that would be the greatest source of misinformation every published by a Federal Agency. I content that a survey of this list would reveal an enormous range of interpretation of national metric policy. Therefore, I suggest that it not be published."
>
> "However, if it is published it is essential that the U.S. Metric Board's interpretation of national metric policy as voted in San Francisco be included in the Introduction. Also, if

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5. See appendix D

> published, it would be absurd to include U.S. Metric Board members and staff since it is clear that the U.S. Metric Board is scheduled for extinction sometime in 1982."

I agree with the comments of Mr. Hannigan. It is apparent that there is an abundance of Federal metrication activity with little, if any, regard for the Congressional intentions stated in the Metric Conversion Act of 1975, as I listed earlier.

In response to Mr. Hannigan's suggestion to include the Board's interpretation of our National policy, Metric Board Executive Director Theodore S. Farfaglia wrote:

> "I do not believe it appropriate to include the San Francisco Resolution in the introduction, since the purpose of this publication is merely to provide a listing of individuals within the Federal Government by agency and subject matter whose duties involve metric activity. The publication is not intended to have any policy or substantive implications."

By not stating the clear intentions of Congress in approving this law, Mr. Farfaglia, and other members of the U.S. Metric Board, are not properly educating or informing the private and public entities that rely upon Government publications. Without mention of the key elements of the 1975 law -- volunteerism, objectivity by the Government sector and no imperial imposition -- the Director, or any other Government publication of the U.S. Metric Board, can be perceived in the wrong light.

*** U.S. Metric Board's Endorsement *** Of Chemical/Instruments Plan

An interesting insight into the workings of the U.S. Metric Board is its recent endorsement of the "conversion plans" for the chemicals and instruments industries. The plan for these industries was developed under the auspices of the American National Metric Council (ANMC). The ANMC is an organization composed almost entirely of SI metric advocates -- many of whom were placed on the U.S. Metric Board at its inception.

The Metric Board's endorsement of the ANMC plan was the first such action by the agency in its over four years of existence. The U.S. Metric Board approved the ANMC plan without changes despite the fact that the Board itself admitted serious weaknesses in the ANMC Chemical and Allied Products Sector Conversion Plan Analysis (CAPS Plan). In a Memorandum to the Planning and Coordination Committee of the U.S. Metric Board it was stated that "the Plan does not address the possible impacts that this proposed conversion might have throughout the whole industry and on the customers of industrial bulk chemicals. Yet, despite these flaws, the Board still concluded that the plan met the Conversion Impact criteria as specified in the USMB Planning Guidelines.

In its overall conclusion on the chemical/allied products conversion plans, the USMB said:

> "Although not a major shortcoming, the plan is weak in its analysis of the impacts the plan would have on the entire chemical industry if implemented. To

> accomplish this type of impact analysis would require sophisticated forecasting methods which are probably beyond the capability of any broadly constituted industry sector committee."

Then why--the logical question arises--did the USMB spend less than two hours to approve the plan with no discussion of these serious omissions? The answer is simple; the vast majority of the Board's members, anxious to prove its worth to Congress and an Administration intent upon abolishing it, glossed over critically important cost and impact considerations in order to hastily report its first accomplishment in over four years.

Another serious flaw in the USMB/ANMC review of the chemical and allied product sector plan was brought out mistakenly in the statement of Charles Verna of the ANMC Ad Hoc Tarriff Task Group. The written statement mentioned "an estimated 43 trillion rates" to be affected in the transportation tarriff price schedules, should metrication reach into the transportation sector. Board Member Tom Hannigan raised the point that in testimony the figure was mentioned as only three trillion, but there was no attempt by the USMB to double-check the figures because of the rushed proceedings.

The real impetus behind the hasty action by the U.S. Metric Board can perhaps be found in the further remarks of Mr. Verna of the American National Metric Council:

> "I believe conversion of industrial chemicals can provide the driving force behind a metric domino effect because these products find their way into just about every durable and consumable good we use."

In summary, I believe the U.S. Metric Board, as a whole, did little to assess the potential negative impacts of conversion in the chemicals and allied products. Many small and large industries objected to the conversion plan promoted by the ANMC to little avail. I think the words of Mr. N. Andy Anderson of the Dakota Fertilizer Co., Inc. summarizes the feelings of many of the less powerful small businesses that are concerned with the USMB plan:

> "The metric system would be detrimental if not disasterous to the farm fertilizer and chemical business...The equipment to apply chemicals is all gauged in the standard liquid and linear measure. Any change would not only confuse the operators and sales people, but will not be understood by the purchasing farmer. We further believe that the farmer will not attempt to learn and understand the metric system."

** COSTS ENORMOUS IN METRIC CONVERSION **

What many people believe to be the most compelling argument in favor of converting to the SI metric system are the purported benefits in world trade to our Nation. One of the specific requirements of the Board in Public Law 94-168 was for the U.S. Metric Board to evaluate the costs and benefits of SI metric, and to minimize any adverse effects resulting from increasing metric usage.

The fully documented General Accounting Office (GAO) report in 1978, "Getting a Better Understanding of the Metric System -- Implications if Adopted by the United States," is the most complete and objective study ever produced on this subject. Along the lines of a cost-benefit analysis, the 757-page study concluded --

* The total cost of metric conversion is undeterminable, but would be substantial -- in the billions of dollars -- resulting in higher consumer prices, the supposed benefits of metric conversion are highly questionable in almost all areas.

* U.S. economic activity and world trade have not been hampered or injured by a dual system of customary and metric measurement, and there is no evidence that a solely metric system would be any better for our economy.

* The purported benefits ascribed by proponents of metric conversion -- for example, standardization and rationalization of measurements -- have taken place under the customary system without metric conversion.

* A case study of metric conversion in the beverage industry demonstrates that this was largely detrimental to the consumer. Most wines and liquor converted to the metric system experienced unit price increases of up to 11 percent greater than those that were not converted.

* Following an extensive study in each area, including comprehensive interviews with industry leaders, the GAO found and reported the following sectors of the U.S. economy can show _no benefit_ from metric conversion, and can continue operating well under the current dual system of measurement:

--U.S. world trade
--U.S. engineering standards
--the fastener industry (screws, nuts, bolts)
--transportation
--automobile dealers
--the metal products industry
--the rubber industry
--the petroleum industry
--the aerospace industry
--the appliance industry
--the paper industry
--surveying and mapping

- --U.S. labor
- --weather reporting
- --sports
- --consumers
- --government (at all levels)

The most ardent proponents of SI metric appear to be:

- --certain government departments at the Federal and state levels
- --educators, curriculum producers, publishers
- --automobile manufacturers
- --international corporations with foreign commerce in nations where metric is already the primary system

On pages 18a and 18b, I have included a two-page chart, entitled, "The Impact and Cost of Metric Conversion," which more completely describes the many billions of dollars and inconveniences suffered by the vast majority of Americans.

Another key point in the debate over the impact of conversion over world trade is the progress of our fellow democratic nations which have attempted more aggressive (i.e. mandatory) government metrication activities. A case in point is the situation in Canada, which recently announced plans to convert, province by province, to SI metric usage. Several affected sectors--including farmers, grocers, retailers, and consumer groups--have revolted from the Canadian Metric Commission's decrees. In some cases, the Canadian Federal Government has threatened fines, and even imprisonment for citizens who refuse to abide by the metrication deadlines.

Similar occurances have been reported from Australia, Great Britain and New Zealand. J. W. Batchelder, the author of "Metric Madness -- over 150 reasons for NOT convering to the Metric System," points out that due to public resistance the British Metrication Board was thrown out on April 30, 1980

THE IMPACT AND COST OF METRIC CONVERSION

REQUIRED ACTION	APPROXIMATE COST	WHO PAYS?	WHO'S AFFECTED?
Re-survey all property	$100 for average residential lot	Landowner	All landowners, municipal recorders
Re-survey roads and rights-of-way	Indeterminable (Millions of dollars)	Local, State, and Federal taxpayers	All levels of government
Replace handtools	Indeterminable (Hundreds of dollars for each worker)	Companies, workers who provide tools, consumers, taxpayers	All companies, government agencies, and individuals who use handtools
Modify machinery	Indeterminable (Thousands of dollars to many companies)	Companies, consumers, taxpayers	All companies, government agencies, individuals who use machinery
Change product sizes	Indeterminable (Billions of dollars)	Consumers	All manufacturers, retailers, and consumers
Retrain workers	Indeterminable (Billions of dollars)	Companies, consumers, taxpayers	Most workers, companies, government agencies
Change computer systems and data bases	Indeterminable (Millions of dollars)	Companies, consumers, taxpayers	All companies, government agencies, organizations, and individuals who use computers and data bases
Change all U.S. engineering standards	Indeterminable (Millions of dollars)	Taxpayers	All engineers, many compan most government agencies
Replace all books with references to weights and measures (schoolbooks, library books, cookbooks, etc.)	Indeterminable (Billions of dollars)	Consumers, taxpayers	All schools, libraries, government agencies, individual bookowners (students, teachers, researchers, etc.)

REQUIRED ACTION	APPROXIMATE COST	WHO PAYS?	WHO'S AFFECTED?
Change all laws, ordinances, codes and regulations with references to weights and measures	Indeterminable (Billions of dollars)	Consumers, taxpayers	All state legislatures, municipal governments, Congress, most government agencies
Replace all maps	Indeterminable (Millions of dollars)	Consumers, taxpayers, companies	Motorists, pilots, all transportation and tourist agencies, libraries, schools, etc.
Replace all scales and measuring devices (rulers, tapes, size charts, etc.)	Indeterminable (Millions of dollars)	Consumers, taxpayers, companies	Most companies, stores, government agencies, organizations, and individuals
Change all thermometers, thermostats, etc.	Indeterminable (Millions of dollars)	Consumers, taxpayers, professionals	All homeowners, doctors, hospitals, companies, stores, organizations, and individuals who own cars, homes, etc
Replace all highway signs	Indeterminable (Billions of dollars)	Taxpayers	All motorists, Federal, State, municipal governments
Teach and learn metric	Indeterminable (Billions of dollars)	Consumers, taxpayers, companies	Everyone

and the New Zealand Metric Advisory Board, admitting conversion failure, voted itself out of existence a few years ago. While governmental mandates continue to be attempted in these nations, the citizenry have either rejected the mandates outright or made it such a controversial issue as to make any imposed conversion efforts futile. I think it is fair to conclude that mandatory conversion efforts do not lend themselves to great popularity. To the contrary, it is natural for citizens of democratic nations -- with histories of democratic processes and reliance upon individual freedom and private sector initiative -- to decry imperial actions by their governments.

One of the biggest fallacies, writes the distinguished Mr. Batchelder -- who has spent over 50 years of his life in American industry, and as an engineer in Vermont -- is the "world is 90% metric" remark spread by SI proponents. There are numerous inconsistencies to this fallacy, not the least of which is the fact that almost every one of the purported "compulsory" metric countries uses our "inch" specifications--sometimes to a greater degree than any one over the 16 "metric" measurement systems in use around the world. Another ignored reality is the vast overall output for world production, of which it is estimated about two-thirds of the total manufactured goods are to inch specifications.

Even if you consider the nations which are "officially" metric (not necessarily SI, however), the SI proponents arrive at misleading conclusions. For example, Mr. Batchelder points out in his characterization of the figure of 44 nations using metric stated by Lewis E. Barbrow in an editorial:

> "The United Nations had 152 members in 1979. Barbrow's 44 metric treaty nations are only 29% of the United Nations' membership and hardly substantiate the fiction inferred by the metric world map. This is especially notable as Barbrow himself was a principle figure in perpetrating the metric world map."

Another critical, and often unmentioned, fact in the "world is 90% metric" fallacy, is that no nation has ever converted to any form of metrics without imposing it by imperial decree. And, in countries where such a conversion was imposed--usually by a totalitarian regime--the literacy rate at the time of imposition was extremely low, and the population was small and reluctant to challenge the ruling dictatorship. Looking at a rundown of the so-called "metric" nations -- North Korea, Cuba, China, Bolivia, Barbados, the Philippines, Bokassa, Haiti and India, to name a few -- it is easy to understand how the pro-metric zealots got carried away with the "world is 90% metric" fallacy.

Why should the United States of America -- which developed the world's greates trade, greatest technological developments, greatest scientific advancements and one of the greatest educational standards using a dual system of customary measures and the metric versions -- be subjected to change to a system (SI), which has not even gained the uniform popularity of the scientists and technicians who allegedly use it the most. As Mr. Batchelder points out in his book, "Even though alleged to be a scientist's system, a sizable group of scientists are strongly opposing metric SI, and the vast majority of us are not scientists anyway."

For those who support the "metric is simpler" argument, I suggest these zealots explain the simplicity in using kilometers over miles, centimeters over inches, liters over quarts, or celcius over fahrenheit to the average housewife, carpenter, land surveyor or small businessman. For the record, it took 16 pages of instructions for the National Bureau of Standards to explain SI, which I might add, has no designation for weight, unless -- as Mr.Batchelder describes, you want to proclaim your new-born baby having a force of so many newtons, rather than saying it weighed 8 and one-half pounds.

One last point I would like to make is a discriptive quote regarding the imposition of an early form of metrics in France, the nation often mentioned as the originators of metric some 300 years ago. Actually, the SI version, the wavelength-based metric system adopted by the General Conference on Measures in 1960, is much different than the "metric" system allowed for dual use with our customary system back in 1866, a variation of the metric system considered by former Secretary of State Thomas Jefferson in 1790, and still different version from the original system devised by French theologians three centuries back.

Noted one Senator during the Senate Commerce Committee hearings in 1972:

> "France, in the 19th century, attempted to impose the metric system as a compulsory system during its Reign of Terror. Napoleon decreed the metric system for countries he conquered but once Napoleon was defeated, and force was removed, those countries chose to abandon the metric system."

As a solution to our present problems with the U.S. Metric Board at the Federal level, I suggest the action recommended by the California Metric Conversion Council last year in its annual Report to the California Legislature and the Governor. As a concluding statement in a report that admitted failure and lack of effectiveness, the Metric Council of the largest state recommended:

> "That the Department of Food and Agriculture withdraw funding for the California Metric Conversion Council until such time as the metric activity within the private sector warrants reinstatement."

By abolishing the U.S. Metric Board, we can send a clear signal to the people that Congress respects the will of the private sector and the true "voluntary" prescription our law requires.

** CONCLUSION **

Much has been stated in my presentation to target the U.S. Metric Board, and its growing list of ancillaries, as unlicensed imposers which have not followed the guidelines set in law by Congress in creating the Board. But the bottom line on the justification for the U.S. Metric Board, is that it just isn't needed.

What functions the Board could theoretically provide can and are being done in the private sector without bureaucratic infringement. If it is in the best interests of an industry, a business, or groups to convert to the SI system, it is a forgone conclusion that they will make the decision without Government pampering. Some multinational corporations have already changed in their own individual best interests.

But it is clear that the vast majority of Americans are violently opposed to a forced conversion. A 1977 Gallup poll showed a decline of 5% in metric popularity, from only about 29% in January to 24% in November 1977. It is also clear that no country has ever converted "voluntarily." All countries now using metric converted by imperial decree. As the slow, if not regressive status of metric usage in our Nation has shown, it would be virtually impossible to mandate SI in a society of 229,000,000 people. For most of our citizens, the customary system of inches, feet, pounds and gallons is a great part of our American heritage -- just as the English language is. And, as I explained in this statement, the tremendous costs of a mandated metric conversion are great -- amounting to over $100 billion by some estimates, not mentioning the headaches and loss in convenience borne by every American -- while the benefits are highly questionable, to say the least.

By failing to exercise our Constitutional and sole authority over weights and measures, Congress and the American people are essentially forfeiting our control to the Government of France, which devised and maintains the supervision of metric measurement. I urge Congress to reaffirm its authority of the American weights and measures by halting the similarly imperial activities of our Federal agencies, which in essence are ignoring the will of the American people. We simply cannot expect to impose a French-created system when we have in place a tremendously successful, and stable, "inch-based" customary system with over 200 years of American tradition behind it. SI, or any other metric deviation, can never replace it, particularly when there is no sound reason to do so. Former Secretary of State John Quincy Adams, in a 245-page report to the 16th Congress on American weights and measures said about the French-devised metric system at the time:

> "(It is) imperfect, susceptible of great improvements and struggling for existence even in a country which gave it birth. . .and as, if ever effected, it can only be by consent and not by force."

As Members of Congress, with the sole Constitutional responsibility for deciding matters relative to our Nation's policy on weights and measures, the duty of stopping unwarrented compulsory actions of our bureaucracy is in our hands.

The U.S. Metric Board and its ad hoc ancillaries have disregarded their orders from Congress for volunteerism and are nothing more than unwanted advocacy organizations. Promotion should be reserved for our capable private sector, not for ambitious Government agencies acting against the wishes of the people. There is no need for the Federal Government to interfere with the marketplace of free will and free choice by individuals and our private sector. The U.S. Metric Board should be abolished outright.

For these reasons, I urge the attention of the Members of this Subcommittee to the legislation I have introduced (H.R. 1660) to repeal the Metric Conversion Act of 1975 and to rid our bureaucracy of arbitrary programs or actions that have been instituted as a result of this Act.

Mr. Chairman, I urge you to proceed with hearings on my bill, H.R. 1660, as soon as possible so that we can eradicate Government-sponsored metrication programs whose existence or objectives are not supported or needed by the American people.

Mr. Chairman, I have attached to my statement extraneous material, and an index to these appendices, to be included in your Subcommittee report.

I thank you for asking me to speak on this issue.

** LIST OF APPENDICES TO RUDD STATEMENT **

Appendix A: 2-page letter from Rudd to OMB Budget Examiner James J. Jukes.

Appendix B: What's Wrong With The Metric SI Meter, by J.W. Batchelder.

Appendix C: Stuffing A Foreign Measurement System Down Our Throats, by J.W. Batchelder.

Appendix D: Correspondence between Metric Board Member Tom Hannigan and Theodore S. Farfaglia, executive director of the Board. (2 letters)

Appendix E: 2 Memorandums, from U.S. Metric Board and ICMP Metrication Operating Committee, on Federal Metric Information Referral Directory.

Appendix F: Sample copy of Rudd letter to 27 major Federal agencies (2 pages).

Appendix G: U.S. Metric Board press release, dated June 10 1981.

Appendix H: 21 Federal agency responses to Rudd letter.

Appendix I: 3-page summary of 1978 GAO report on metric conversion.

Appendix J: 3-page Publisher's Preface from Metric Madness, by J.W. Batchelder, 1981, published by American Institute of Weights and Measures.

Appendix A (2 pages)

ELDON RUDD
4th District, Arizona

Washington Office
1110 Longworth Building
Washington, D.C. 20515
(202) 225-[illegible]

District Office
6900 E. Camelback Road
Scottsdale, Arizona 85251
(602) 241-[illegible]

Congress of the United States
House of Representatives
Washington, D.C. 20515

COMMITTEE ON APPROPRI

COMMITTEE ON BUDG
TASK FORCES:
DEFENSE AND INTERNATIO
AFFAIRS
INFLATION

COMMITTEE ON COMM

September 22, 1981

Mr. James J. Jukes
Budget Examiner
Office of Management and Budget
New Executive Office Building, Room 9217
Washington, D.C. 20503

Dear Mr. Jukes,

In reference to your call to my office, I have enclosed a copy of my bill (H.R. 1660, to repeal the Metric Conversion Act of 1975) and other materials in support of abolishing the funding for the U.S. Metric Board.

After spending about $7 million in less than four years, the U.S. Metric Board has already demonstrated that metric conversion cannot be accomplished by the private sector without tremendous costs in time, money and convenience. Countless millions have already been spent by our major Federal agencies trying to implement metrics on the American public -- with little success. Eliminating the FY 1982 budget of $2,708,000 for the U.S. Metric Board would end unnecessary Federal Government promotion and encouragement of a system devised by the French.

The issue is clear and simple: we should not be using tax dollars to subsidize metric conversion when it is supposed to be voluntary -- the clear intent of Congress. The private sector can make such a move if, or when, it deems it necessary.

Our Government should not be in the business of promoting and, in effect, mandating a system of weights and measures upon the American taxpayers. All countries now using the metric system converted by imperial decree; in countries where such a conversion was imposed, the literacy rate at the time of imposition was low, and the population was small and reluctant to challenge the totalitarian regime. As the slow progress of metric usage in our Nation has shown, it would be virtually impossible to mandate metrics in a society of 229,000,000 people -- who have built the greatest democratic and most advanced Country in the world with our customary system of weights and measures. I should point out that if metric measurements were imposed in

America, our system of weights and measures would then be dictated by the French Government instead of by Congress as the Constitution provides.

A 1978 report by the General Accounting Office documents the U.S. Metric Board's failure in properly educating and assisting the public; the Board has continually misled the public into believing that a firm National policy exists which mandates metric conversion by some arbitrary date. Congress made no such commitment in the 1975 law.

The Metric Board's ad hoc Interagency Committee on Metric Policy (ICMP), composed of agency representatives, has continually taken bureaucratic initiatives in metric conversion ahead of the private sector. The Board, set up to assist the private sector, has defied the law in not acknowledging the lead role of private industry in metric usage.

Quite simply, there is no need for the Federal Government to interfere with the marketplace and the free choice of the private sector. If a business wishes to contemplate conversion, there are already numerous groups (i.e. the American National Metric Council) from which to seek counsel. The U.S. Metric Board is wasteful, a burden to the private sector and serves no meaningful purpose.

In keeping with the President's promise to lift the Federal Government "off the backs of the American people," I strongly urge the abolishment of funds for the U.S. Metric Board.

If you are in need of further information or assistance, please contact my office.

With every good wish,

Sincerely,

Eldon Rudd

Eldon Rudd
Member of Congress

ER:tt

Enclosures

Appendix B

WHAT'S WRONG WITH THE METRIC SI METER

1 newton = 9.80665 kilograms

1 meter = 39.37 inches - 3.280833 feet.

SI acceleration due to gravity = 9.80665 meters / sec. / sec.

9.80665 x 3.2808 = 32.173657 feet / sec, / sec. which is the acceleration in our conventional system.

BUT, 9.80665 is NOT 10, upon which we are assured that metric is based.

For the acceleration due to gravity-to be 10 in the SI system, the meter should be :-

$\frac{9.80665}{10}$ x 39.37 or 38.60878 inches or 3.217398 feet.

10 meters / sec. / sec. at 3.217398 feet per meter =

32.17398 feet per sec. / sec.

Similar digits, but with decimal points in various places, occur in converting from grams to dynes, also atmospheric pressure and grams (force) to newtons per square meter.

Since metric weight and volume units are based on the meter, they are similarly affected.

Numerous other examples can be cited where metric is neither coherent nor arranged in increments of 10, as loudly proclaimed, such as when converting from meters per second to kilometers per hour, etc.

Since physicists played principle roles in concocting the metric system and the many subsequent attempts to make it practicable, we are confronted with the astounding enigma of why they never made it consistent with the laws of physics.

J. W. Batchelder.

STUFFING A FOREIGN MEASUREMENT SYSTEM DOWN OUR THROATS

Of the 10 or 12 different versions of metric measures in use, Congress specified the 1960 SI version in PL 94-168 of December 23, 1975 (a most cynical Christmas present). SI metric is under the sole control of the General Conference of Weights and Measures (CGPM), the International Committee for Weights and Measures (CIPM) and the International Bureau of Weights and Measures (BIPM) in Sevres, near Paris, France.

Metric manufacturing tolerances (fits) standards are under the control of the International Organization for Standardization (ISO) in Geneva, Switzerland. The U. S. is outvoted 43 or more to 1 in these outfits as each member has but one vote. Consequently the Dominican Republic or Camaroon has as much influence on SI measures as the U. S., hardly proportional representation. However, as usual with such foreign involvements, the U. S. picks up the tab on the far larger share when it comes to financial support, as that is proportioned according to the population of member nations.

Moreover, the scales are loaded in favor of "true believer" nations in that those having compulsory metric pay only half as much per million of population as countries where metric is optional, such as the U. S. Consequently a nation can claim that it is compulsory and regardless of whether it can actually deliver substantial metric usage, or even seriously intends to, it can cut its support payments in half. In that way the other nations, including the U. S., pay a still larger share.

The French delegation has exclusive direction and supervision of the production of measurement prototypes for distribution to other nations.

By failing to assert its Constitutional and sole authority over weights and measures, Congress is losing it by default to foreign metric countries, predominantly France, who not only concocted this contrived system, but largely maintained control.

Although the purported major object of the Great Metric Crusade is the achievement of worldwide uniformity of weights and measures, many of these actually in universal use for centuries are as welcome at the French metric Mecca as skunks at a christening, such as nautical miles, standard time, trigonometry, watts of electrical energy, etc.

The wizards of metric legerdemain in France perpetually change metric terms, unit values and/or tolerances like a kaleidoscope and these most certainly are being rammed down our throats by foreigners by means of the above PL 94-168. The Kelvin temperature scale hadn't hardly got settled in when it was evicted. The infamous liquor and wine ripoffs, metric autos and tires and liter gasolene are classic examples of foreign measurements rammed down out throats of which Congress took no notice.

J. W. Batchelder.

JWB/c

Appendix D (2 pages)

IBEW

1125-15th St. N.W.
Washington, D.C.
20005

December 18, 1981

Mr. John M. Tascher
MOC Executive Secretary
1600 Wilson Boulevard
Suite 400
Arlington, Virginia 22209

Dear Mr. Tascher:

The Federal Metric Information Referral Directory is a list of people that would be the greatest source of misinformation ever published by a Federal Agency. I contend that a survey of this list would reveal an enormous range of interpretation of national metric policy. Therefore, I suggest that it not be published.

However, if it is published it is essential that the U.S. Metric Board's interpretation of national metric policy as voted in San Francisco be included in the Introduction. Also, if published, it would be absurd to include U.S. Metric Board members and staff since it is clear that the U.S. Metric Board is scheduled for extinction sometime in 1982.

Best wishes.

Sincerely,

Tom

Thomas A. Hannigan
Administrative Assistant to
the International Secretary
and
Member, U.S. Metric Board

TAH:veb
cc: T. Farfaglia
J. Miller
A. Kenopensky

Suite 400
1600 Wilson Boulevard
Arlington, Virginia 22209

January 18, 1982

Honorable Thomas A. Hannigan
Assistant to the International Secretary
International Brotherhood of Electrical Workers
1125 15th Street, N. W.
Washington, D. C. 20053

Dear Tom:

This replies to your letter of December 18, 1981 to Mr. John M. Tascher stating your views on the Federal Information Referral Directory.

Specifically, you oppose publication because the persons listed, in your opinion, would not accurately interpret national metric policy. In this regard, you suggest including a copy of the Board's interpretation of national metric policy as voted in San Francisco. You also believe that U.S. Metric Board members and staff should not be listed since the Board is scheduled for termination.

I do not believe it appropriate to include the San Francisco Resolution in the introduction, since the purpose of this publication is merely to provide a listing of individuals within the Federal Government by agency and subject matter whose duties involve metric activity. The publication is not intended to have any policy or substantive implications.

Although the Administration has proposed terminating the Board, I believe it appropriate to list the Board members and staff in the Directory. At present, it appears the Board will be in existence for at least six months after the Directory is published. Accordingly, Board and staff are appropriate contacts for questions and information.

Your letter and my proposed reply was brought to the attention of the Planning and Coordination Committee at its meeting in San Diego. The Committee concurred in my recommended approach.

With warmest personal regards,

Sincerely,

Ted

Theodore S. Farfaglia
Executive Director

Metrication Operating Committee of the Interagency Committee on Metric Poli

Chairman
Room 2A 318
Pentagon
Washington, DC 20301

Executive Secretariat
Suite 600
1815 North Lynn St
Arlington, Virginia 22209

Survey listed Index

November 3, 1981

MEMORANDUM TO THE ICMP METRICATION OPERATING COMMITTEE

From: Howard B. Ellsworth, MOC Chairman Howard B. Ellsworth

Subject: Review and Approval of Federal Metric Information Referral Directory

By memorandum dated March 12, 1981, I asked each MOC agency to provide to the MOC Executive Secretary a list of its "pre-eminent" program areas that closely interface with some sector of public activity. In addition I asked for the name, address and telephone number of an agency person knowledgeable about metric conversion activities in each of those areas. The Executive Secretary has developed the attached draft Federal Metric Information Referral Directory, dated November 2, 1981, based on the responses.

Before the Directory is published and distributed to the MOC, to trade associations, to State metric representatives, and to other interested parties, I am asking that each of you closely review the Directory for accuracy and completeness. Please use the attached form in indicating whether or not you approve the Directory, and return the form by December 18, 1981 to:

Mr. John M. Tascher
MOC Executive Secretary
1600 Wilson Boulevard
Suite 400
Arlington, Virginia 22209

You are encouraged to indicate needed changes for accuracy, add new pre-eminent areas and names, and to suggest other changes to enhance completeness and accuracy. Also, please indicate whether the persons on the list from your agency are aware that they are on the list in order that they can anticipate requests for information. The U.S. Metric Board's Committee on Planning and Coordination has reviewed an earlier draft of the Directory and will review the final draft before publication.

Thank you for your cooperation in this important effort.

What the Boards Role

UNITED STATES METRIC BOARD
Suite 400
1600 Wilson Boulevard
Arlington, Virginia 22209

November 13, 1981

MEMORANDUM TO THE BOARD

Through: Theodore S. Farfaglia TSF
Executive Director

From: Stanley R. Parent Stan Parent 11/13/81
Director, Office of Research,
Coordination and Planning

who ppo

Subject: Review and Comments on Federal Metric Information Referral Directory

Attached is a copy of the draft Federal Metric Information Referral Directory, dated November 2, 1981, which was developed by the ICMP Metrication Operating Committee (MOC). On November 3, the MOC Chairman, Howard Ellsworth, sent the draft Directory out to the MOC for final review. Concurrently, I am asking you to review the document and suggest any comments (e.g., how individual Board Members want to be listed in the USMB membership list on pages 41-42). Please send your comments to John Tascher by December 18, 1981.

The purpose of the Directory is to list names, addresses, and telephone numbers of Federal agency personnel who are knowledgeable about the status of metrication within major areas of Federal responsibility.

The Coordination and Planning Committee reviewed this earlier draft at its September meeting in Baltimore and suggested several changes, including listing of the U.S. Metric Board members within their constituency areas. These changes have been incorporated into the enclosed draft. It is planned that the Coordination and Planning Committee, at its January meeting, will give final review and approval for publication after considering the comments from the U.S. Metric Board and staff and approval of the MOC.

who??

Attachment

cc:
L. Hall

absent me
USMB Mem
& Sta
aware it al
exist pa

Appendix F (2 pages)

WASHINGTON OFFICE:
[illegible]
Washington, D.C. [illegible]
[illegible]

DISTRICT OFFICE:
[illegible]
[illegible], Arizona [illegible]
[illegible]

Congreſs of the United States
Houſe of Repreſentatives
Waſhington, D.C. 20515

COMMITTEE ON BUDG
TASK FORCES:
DEFENSE AND INTERNATIO
AFFAIRS
INFLATION

COMMITTEE ON COMMIT

June 23, 1981

Honorable Caspar Weinberger
Secretary of Defense
Department of Defense
The Pentagon
Washington, D. C. 20301

Dear Mr. Secretary:

The U.S. Metric Board, in conjunction with its other pro-metric activities, has been orchestrating and advocating a timetable for conversion to the metric system with many major Federal agencies, including the one you head.

The Board's most recent self-serving endeavor, I understand, was to issue guidelines to the participating agencies for converting the measurement units in the respective news releases of the departments. Enclosed is a copy of the Board's announcement of this.

This newest effort -- which is only a pebble in a truckload of stones the U.S. Metric Board is intent upon "voluntarily" hurling at the already over-regulated American taxpayer -- is another example of the Board's blatant attempt to force the metric system down the throats of the American people.

There is no deadline or timetable for anyone or any Government Agency to switch to metric because it is against the law as it is now written to impose the metric system on the people of our Country. An opposite impression through Government action will not serve the citizens well.

Furthermore, any effort to this effect seems to be in total disregard of the popular mandate of President Reagan, who has talked and talked about regulatory reform and the need to get the Government off the backs of the American people. Unfortunately, the small group of zealots from the metric world are intent upon campaigning for an idea that the American public does not want to finance.

I realize that the metric issue is not, in itself, a matter of top priority in Washington policymaking. However, it does offer an excellent opportunity for the Federal Government to prove to the American people just how serious it is in ridding them of another costly task -- one with virtually no benefit to our Nation's economy or welfare -- that can only add to the continued growth of the Government.

I appreciate the work your department has accomplished to this date in serving the taxpayers of this Country.

Sincerely,

Eldon Rudd

Eldon Rudd
Member of Congress

ER/tq

Appendix G

U.S. METRIC BOARD

NEWS RELEASE

FOR IMMEDIATE RELEASE

Contact: Linda Cook
U.S. Metric Board
(703) 235-2820

FEDERAL NEWS RELEASES TO USE METRIC TERMS

WASHINGTON, D.C., June 10, 1981 — Major Federal agencies have agreed to use metric as well as customary measurement terms in their news releases. The agencies are members of the Interagency Committee on Metric Policy (ICMP), which was chartered by the U.S. Metric Board to coordinate the Federal government's metric policies and activities. The ICMP recently adopted the resolution to include metric equivalents parenthetically whenever customary measurement units are mentioned in press releases.

"This new policy reflects the increasing use of dual units of measurement in weekly news magazines, technical publications and other media that tap Federal news sources," said Dr. Louis F. Polk, Chairman of the ICMP.

Guidelines have been issued to the agencies for converting customary measurement units to their metric counterparts to ensure consistency in the factors used for conversion. Some agencies have already been including metrics in their news releases, and the rest will put the policy into practice after a 90-day "preparation" period ending August 7, 1981.

The participating Federal agencies are listed below.

Department of Agriculture
Department of Defense
Department of Energy
Department of Health and Human Services
Department of Housing and Urban Development
Department of Interior
Department of State
Department of Transportation
Consumer Product Safety Commission
Environmental Protection Agency
Export Import Bank
Federal Communications Commission
General Services Administration
Government Printing Office
Library of Congress
National Aeronautics and Space Administration
Small Business Administration
Smithsonian Institution
Tennessee Valley Authority
U.S. Office of Technology Assessment
U.S. Postal Service
Veterans Administration

Washington, D.C. 20230

22 JUL 1981

JUL 29 1981

Honorable Eldon Rudd
House of Representatives
Washington, D.C. 20515

Dear Mr. Rudd:

Thank you for your letter concerning the Department's role in U.S. metric conversion.

We have been generally supportive of the activities of the U.S. Metric Board's Interagency Committee on Metric Policy (ICMP). The goal of the Department is to convert all appropriate activities to metric usage by 1985. Metric conversion costs are handled as normal operating expenses within existing budget limitations. Our policy is that conversion measures shall not be carried out until the Departmental office or operating unit concerned has considered the expected costs and benefits of the proposed measures. These anticipated costs and benefits relate not only to the particular program affected, but also to the impact the proposed measure may have on other interests, including the private sector. A copy of the FY 1980 report of the Department's Metric Committee is enclosed.

You also refer to the ICMP resolution to have Federal agencies use metric measurement units in conjunction with customary units in agency news releases. The Department is reviewing this resolution to determine whether it will participate in its implementation.

I hope the above information on our metric conversion policy is helpful.

Sincerely,

Mac Baldrige

Secretary of Commerce

Enclosure

THE SECRETARY
WASHINGTON, D.C. 20202

JUL 27 1981

The Honorable Eldon Rudd
House of Representatives
Washington, D.C. 20515

Dear Mr. Rudd:

Thank you for your letter regarding the activities of the U.S. Metric Board and the implementation of the metric system. As you state in your letter, the Metric Board is not a part of the Department of Education.

The Department of Education's only role in the area of metric conversion is funding of the Metric Education Program authorized under P.L. 95-561, Title III, Part B, Section 311. The role of this program, as specified in the legislation, is to encourage educational agencies and institutions to develop programs to prepare students to use the metric system of measurement on a voluntary basis. The program issues competitive discretionary grants and contracts to eligible agencies for training purposes only. The language of the law and the program's regulations state clearly that the metric system of measurement will be adopted on a voluntary basis.

As with other programs in Title III, Metric Education has been included in the consolidated grant proposal before the Congress. Under this proposal, States would be allowed to use these funds for a variety of purposes, including metric education programs.

I hope that this information is helpful. Please let me know if I may be of any further assistance.

Sincerely,

T. H. Bell

United States Department of the Interior

OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20240

JUL 27 1981

Honorable Eldon Rudd
House of Representatives
Washington, D.C. 20515

Dear Mr. Rudd:

Thank you for your letter of June 23. We inquired into your specific concern over the metric issue, and we share your understanding of the law. Conversion to metric system use is to be voluntary. Since the Congress has not instructed Federal agencies to mandate conversions, initiatives will primarily come from the private sector. It is also our understanding that the Metric Conversion Act of 1975 specifically directs Federal agencies not to impede voluntary conversions by others, particularly the private sector and State and local governments. The Department of the Interior is trying to steer a middle course between these two requirements.

The agreement to join with other Federal agencies to include metric units in press releases was made as a public service for those who are using or learning about the metric system. Those using our press releases are under no obligation to include the metric units. Anyone wishing to use the metric amounts, however, is saved the effort of computing the metric units.

Again, thank you for sharing your concerns with us. We always appreciate hearing from those affected by or concerned with actions of the Department.

Sincerely,

Donald Paul Hodel
Under SECRETARY

U.S. SMALL BUSINESS ADMINISTRATION
WASHINGTON, D.C. 20416

OFFICE OF THE ADMINISTRATOR

AUG 20 1981

Honorable Eldon Rudd
House of Representatives
Washington, D. C. 20510

Dear Congressman Rudd:

I am pleased to respond to your letter of June 23, 1981, which referenced the activities of the United States Metric Board. Please be assured that we share your concern wherever the recommendations and actions of the Metric Board or any of its subcommittees offers a potential adverse impact on the small business community. For this reason, small business representation before the board is paramount and it is my intention to closely monitor the activities of the U. S. Metric Board and to maintain a highly visible and active role on behalf of small businesses everywhere.

I appreciate you bringing this matter to my attention and would like again to assure you that small business representation will be actively maintained before the Metric Board to prevent the imposition of added costs, increased paperwork requirements or growth in regulatory burdens.

Sincerely,

Michael Cardenas

Michael Cardenas
Administrator

AUG [illegible]

Department of Energy
Washington, D.C. 20585

AUG 4 1981

Honorable Eldon Rudd
House of Representatives
Washington, D.C. 20515

Dear Mr. Rudd:

The Secretary has asked me to respond to your recent letter concerning the U.S. Metric Board's efforts regarding the metric conversion of measurement units in Federal agencies' news releases.

The Department of Energy (DOE) believes that the action recommended by the Metric Board is consistent with the increased use of metric units by U.S. news services and the private sector. While implementation of the Board's recommendation is not mandatory, DOE believes that the Department has a responsibility to be consistent with private sector initiatives and with other Federal agencies.

I appreciate your interest in this matter. If I can be of further assistance, please don't hesitate to contact me.

Sincerely,

Barton R. House

Barton R. House
Acting Assistant Secretary for
Environmental Protection,
Safety, and Emergency Preparedness

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CLARENCE E. MILLER, OHIO
COOPER EVANS, IOWA
JOHN H. GIBBONS

Congreſs of the United States
OFFICE OF TECHNOLOGY ASSESSMENT
WASHINGTON, D.C. 20510

JOHN H. GIBBC
DIRECTOR

September 3, 1981

The Honorable Eldon Rudd
U.S. House of Representatives
Washington, DC 20515

Dear Congressman Rudd:

Thank you for your letter concerning the activities of the U.S. Metric Board.

You are, of course, correct that present law imposes no deadline for the conversion to metric by Government agencies. OTA reports use whatever units are appropriate to the subject at hand--common units for most subjects, metric equivalents in presentation of some highly technical data. We have no present plans to require metric equivalents in our final published products.

Sincerely,

best wishes

Jack Gibbons

John H. Gibbons

ASSISTANT POSTMASTER GENERAL
Government Relations Department
Washington, DC 20260

JUL 13 1981

Honorable Eldon Rudd
House of Representatives
Washington, D.C. 20515

Dear Congressman Rudd:

This is in response to your letter of June 23 to Postmaster General William F. Bolger, concerning the Postal Service's involvement in conversion to the metric system of weights and measures.

The Metric Conversion Act of 1975 (Public Law 94-168, 15 U.S.C. 205), was enacted on December 23, 1975. It declares a national policy of encouraging and coordinating the increasing use of the metric system in the United States. This conversion, however, is to be done on a voluntary basis. Conversion to metric weights and measures by the Postal Service would for the most part have to follow a general movement in this direction by our customers. At this point, there is no evidence of such a movement.

If I can be of additional assistance, please let me know.

Sincerely,

William T. Johnstone
Special Assistant to the
Assistant Postmaster General

DEPARTMENT OF STATE
Washington, D.C. 20520

JUL 08 1981

JULY 1 - 1981

Dear Mr. Rudd:

Secretary Haig has asked me to reply to your letter of June 23 on the use of the metric system in State Department news releases.

For the benefit of our readers, particularly those in foreign countries, Department editors do occasionally include metric equivalents alongside the conventional U.S. measurements appearing in our publications. However, as you point out in your letter, this is a voluntary policy. It affects only a small percentage of our publications, and it has no impact on printing costs.

You may rest assured that we in the Department share your concern about the need to control expenses.

Sincerely,

Richard Fairbanks
Assistant Secretary
for Congressional Relations

The Honorable
Eldon Rudd,
House of Representatives.

EXPORT-IMPORT BANK OF THE UNITED STATES
WASHINGTON, D.C. 20571

BOARD OF DIRECTORS

CABLE ADDRESS "EXIMBANK"
TELEX [illegible]

June 30, 1981

JUN 06 1981

Dear Mr. Rudd:

We have received your letter of June 23, 1981, addressed to our former Chairman John Moore, concerning utilization of the metric system by Federal agencies.

We very much appreciate your sharing your thoughts on this matter with us. With respect to news releases issued by the Export-Import Bank, the information on financing transactions contained in our releases generally involves monetary amounts and not units which would involve a metric measurement.

Thank you for your concern about this matter as it relates to the Export-Import Bank.

Sincerely yours,

Margaret W. Kahliff

Margaret W. Kahliff
Acting Chairman

Honorable Eldon Rudd
U. S. House of Representatives
1110 Longworth Building
Washington, D. C. 20515

Administrator
of Veterans Affairs

Veterans
Administration

JULY 7 - 1981

JUL 08 1981

Honorable Eldon Rudd
House of Representatives
Washington, D.C. 20515

Dear Mr. Rudd:

I am pleased to respond to your letter of June 23, 1981, regarding U.S. Government Agency participation in metric conversion.

The Guidelines for Converting Measurement Units in Agency Press Releases to Metric Units (SI), which were recently distributed to participating agencies, were the result of a desire to assist the U.S. Metric Board in satisfying the requirements of the Metric Conversion Act of 1975. Also, there was a desire on the part of Federal agencies to be in step with the increasing use of the metric system in the news media and the rest of society.

The Veterans Administration reviewed the draft "Guidelines" and concurred in their use, by the VA, when issuing press releases containing customary measurement units. It is the intent of the VA to follow the dictates of private industry with our metric conversion policy. As new conversions take place in the private sector, the VA will take steps to include them in its requirements.

Your interest in the Veterans Administration is appreciated.

Sincerely,

DONALD L. CUSTIS, M. D.
Acting Administrator

U. S. Department of Labor

Office of the Assistant Secretary
for Administration and Management
Washington, D.C. 20210

JUL 16 1981

JUL 15 1981

Honorable Eldon Rudd
House of Representatives
Washington, D. C. 20515

Dear Congressman Rudd:

The Secretary asked me to respond to your July 1, 1981 letter regarding DOL policy on metric matters.

The Department of Labor does not have any statutory or regulatory responsibilities which make it mandatory for us to assume a leadership role concerning metric conversion. Therefore, we are not contemplating any aggressive action to cause conversion to the metric system. We may, however, on a case by case basis, release dual measurement information when it is in the best interests of a significant portion of the group to which the publication is directed. In any event, it is our intention to follow the dictates of Administration policy on metrication.

I hope I have been responsive to your concerns regarding metric conversion, but if not, please let me know. Also, in closing I would like to thank you on behalf of the Secretary for your kind words regarding the Department's cooperation with the Congress and our accomplishments to date in serving the tax payers of this country.

Sincerely,

ALFRED M. ZUCK
Assistant Secretary for
Administration and Management

THE SECRETARY OF HOUSING AND URBAN DEVELOPMENT
WASHINGTON, D.C. 20410

JUL 08 1981

July 7, 1981

Honorable Eldon Rudd
House of Representatives
Washington, D. C. 20515

Dear Mr. Rudd:

This is in reply to your letter of June 23, 1981 concerning the use of metrics.

This agency is not promoting the use of metrics nor do we have deadlines or timetables to convert to the metric system. We are, however, following the directives of the Metric Conversion Act of 1975, PL 94-168. To facilitate us in doing this we look to the U. S. Metric Board for assistance and guidance. The Board, charged with coordinating the voluntary conversion to the metric system, must consult with Federal agencies. In addition, according to Section 6(7) of the Act, the Board must "... assist the public through information and education programs, to become familiar with the meaning and applicability of metric terms and measures in daily life. Such programs shall include ... (D) such public information activities, by any Federal agency in support of this Act, as related to the mission of such agency". In order to satisfy this directive to educate, we are now using both customary and metric units in our news releases where appropriate.

We are by no means promoting metrics. We are accepting metric measurements when requested to do so by industry or the public. This is our understanding of a Federal agency's role in the voluntary conversion to metrics.

Very sincerely yours,

Samuel R Pierce Jr

Samuel R. Pierce, Jr.

TENNESSEE VALLEY AUTHORITY
KNOXVILLE, TENNESSEE 37902

OFFICE OF THE BOARD OF DIRECTORS

JUL 21 1981

The Honorable Eldou Rudd
The House of Representatives
Washington, DC 20515

Dear Mr. Rudd:

Thank you for your June 23 letter to Director S. David Freeman about the metric system.

TVA has made no efforts to force any segment of our economy to make the conversion, and it would not be TVA's responsibility to do so. We have, however, worked with Federal agencies such as the U.S. Metric Board and private organizations such as the American National Metric Council to keep informed about the voluntary conversion in the private sector. The metric system is widely used in fields such as medicine, science, and space exploration. The Metric Conversion Act of 1975 does declare a policy to coordinate and plan the increasing use of the metric system in the United States and establishes the Metric Board to coordinate the voluntary conversion to the system. We have as a Federal agency cooperated in coordinating Federal agency metric conversion efforts.

Various organizations within TVA have been using the metric system for some time, and reports both in the press and in internal newsletters have reflected this use. We agreed to include metric equivalents in press releases in an effort to be cooperative with the U.S. Metric Board. However, we do not intend this participation to indicate any determination by TVA that it would be appropriate for others to convert to the metric system.

Sincerely,

C. H. Dean, Jr.
Chairman

cc: Dr. Louis F. Polk, Chairman
U.S. Metric Board
Suite 600
1815 North Lynn Street
Arlington, Virginia 22209

Mr. Howard B. Ellsworth, Chairman
Metrication Operating Committee
Room 2A 318
Pentagon
Washington, DC 20301

DEPARTMENT OF AGRICULTURE
OFFICE OF THE SECRETARY
WASHINGTON, D. C. 20250

JUN 29 1981

July 28 1981

Honorable Eldon Rudd
U.S. House of Representatives
Washington, D.C. 20515

Dear Congressman Rudd:

In further comment on your thoughtful letter regarding the metric system and its use by government agencies, I have the following comments.

From the outset this Department has fully recognized the fact that implementation of the metric system in the United States is voluntary and has been guided by this principle in dealing with the public.

USDA metric policy specifically prohibits any agency action that would compel our various constituencies to adopt metric units. Instead, we have provided assistance when it was requested, as was the case with the fruit and vegetable sector.

Within the Department, the use of metric measurements by our science and foreign trade agencies has long been standard practice. However, in all cases we are guided explicitly by the needs and desires of the public we serve.

Although the Department of Agriculture previously adopted the practice of including metric equivalents parenthetically whenever inch-pound units are used in press releases, that action was never designed as a form of compulsion. We simply make available conversion tools for those who choose to use them. By the same token, USDA has no formal metric literature for general distribution, but does provide specific data on request such as to cookbook editors.

I fully appreciate the need for less, rather than more, governmental regulation and shall continue vigorously to support President Reagan's policies in this regard, including the issue of metric conversion.

Sincerely,

John R Block

JOHN R. BLOCK
Secretary

SEP 8 1981

U.S. CONSUMER PRODUCT SAFETY COMMISSION
WASHINGTON, D.C. 20207

0 2 SEP 1981

The Honorable Eldon Rudd
House of Representatives
Washington, D.C. 20515

Dear Representative Rudd:

Thank you for your letter to Acting Chairman Pittle dated June 23, 1981, in which you communicated your views on the U.S. Metric Board and their efforts to have government agencies include metric equivalents whenever customary measurement units are mentioned in press releases.

Where its regulations call for the use of dimensions, the Commission generally states both the English and metric values for the convenience of the reader. However, in issuing regulations, the Commission is interested in whether the product's size, strength, etc., is proper and not in what unit of measure the manufacturer uses to achieve this goal.

The Commission's press releases rarely go into the kind of detail that requires the statement of particular dimensions. However, if this situation arises, we anticipate that, as a convenience, the releases would state both the English and metric units.

I hope this information has been helpful. Please do not hesitate to contact me if you need any further information about the Commission's activities.

Sincerely,

Dorothy J Moss

Dorothy J. Moss
Senior Congressional
Relations Specialist

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

AUG 10 1981

THE ADMINISTRATOR

Honorable Eldon Rudd
House of Representatives
Washington, D.C. 20515

Dear Mr. Rudd:

Thank you for your letter of June 23, 1981 concerning the activities of the U.S. Metric Board.

As you have noted, the Metric Conversion Act (P.L. 94-168) provides no authority to impose the use of the metric system on anyone. The Act supports voluntary use of the metric system in the United States and established the U.S. Metric Board only for the purpose of coordinating this voluntary activity.

The guidelines mentioned in the U.S. Metric Board's news release had their roots in actions within the participating agencies themselves for voluntary adoption of the metric system. The Board provides coordination, a uniform process for numerical conversion, and standard use of metric terms.

Even though the metric system has been in use by the Environmental Protection Agency (EPA) as its primary measurement system since 1973, there is no requirement in any EPA regulation or standard that the public use either metric or customary measurement units for compliance. We continue to view metric conversion by the public as voluntary, and to be fully responsive to the public we will continue to accept use of either measurement system.

Sincerely yours,

Anne M. Gorsuch

Office of Legal Counsel

AUG 03 1981

Office of the
Deputy Assistant Attorney General

Washington, D.C. 20530

31 JUL 1981

Honorable Eldon Rudd
House of Representatives
Washington, D.C. 20515

Dear Congressman Rudd:

This responds to your letter of July 1, 1981 to the Attorney General regarding certain activities of the United States Metric Board.

As you are aware, the Department of Justice does not participate as a member of the Interagency Committee on Metric Policy. We therefore have no information regarding its activities. We would suggest that you might want to contact the various federal agencies which are represented on that committee and express to them the concerns voiced in your July 1 letter to the Attorney General.

We regret that we are unable to provide you with any further information related to the concerns raised in your letter to the Attorney General.

Sincerely,

Larry L. Simms
Deputy Assistant Attorney General
Office of Legal Counsel

The Secretary of Transportation
Washington, D.C. 20590

The Honorable Eldon Rudd
House of Representatives
Washington, D.C. 20515

Dear Mr. Rudd:

This is in response to your recent letter concerning the Department of Transportation's use of metric as well as customary measurement terms in our press releases.

It is our understanding that the agreement, described in the June 17, U.S. Metric Board news release, to use metric equivalents is purely voluntary and that the guidelines issued by the Board are designed merely to assist in making the proper conversions.

There is no intention by this Department to begin to use metric equivalents in all its news releases. It is possible, however, that occasions may arise when a press release with international implications and intended for an international audience might include some metric equivalents.

Please be assured that the Department of Transportation is mindful of the President's policy of reducing the regulatory burden on the American people and American industry and, as you know, we have already taken a number of steps to accomplish this goal.

Sincerely,

Drew Lewis

THE SECRETARY OF HEALTH AND HUMAN SERVICES
WASHINGTON, D.C. 20201

AUG 19 1981

AUG [illegible] 1981

The Honorable Eldon Rudd
House of Representatives
Washington, D.C. 20515

Dear Mr. Rudd:

In response to your June 23 letter, I can assure you that this Department is not on a timetable for implementing dual forms of measurement in its news releases.

While certain scientific information from the Food and Drug Administration and the National Institutes of Health has employed dual measurements when appropriate, we have no plans to require general use throughout the Department.

Sincerely,

Dick Schweiker
Richard S. Schweiker
Secretary

DEPARTMENT OF THE TREASURY
WASHINGTON, D.C. 20220

ASSISTANT SECRETARY

August 19, 1981

AUG 24 1981

Dear Mr. Rudd:

I am responding to your July 1, 1981, letter to the Secretary of the Treasury, in which you have asked for information concerning the Department's role or policy in the implementation of the metric system.

To date, there has been no real need for a formal metric policy within Treasury since our involvement in metric conversion is minimal. Consequently, no formal policy has been developed and we currently have no plans to do so in the immediate future.

However, years ago when the Interagency Committee for Metric Policy (ICMP) and the Metric Operating Committee (MOC), which is a subcommittee of the ICMP, were established, the Department elected to participate on each of these committees as a voting member rather than a non-voting observer member. We did so in order to have a voice in the establishment of Federal metric policy and guidelines which, once adopted would have an impact on Treasury. We are currently still represented on these committees.

I wish to express our thanks for the kind words, contained in your letter, concerning the Department's cooperation with Congress and accomplishments to date. If we may be of further assistance, please let us know.

Sincerely,

Richard H Prendergast
for Dennis Thomas
Assistant Secretary
(Legislative Affairs)

The Honorable
Eldon Rudd
House of Representatives
Washington, DC 20515

THE SECRETARY OF DEFENSE
WASHINGTON, D.C. 20301

JUN 17 1980

JUL 24 1981

28

Honorable Eldon Rudd
House of Representatives
Washington, D. C. 20515

Dear Congressman:

This is in reply to your recent letter regarding federal guidelines on the use of metric units in agency press releases. We share your understanding that Public Law 94-168 (U.S. Metric Act) is entirely voluntary. I want to assure you that we are complying with the intent of that law in our press release activities.

The metric press release guidelines do provide for uniformity in the selection and use of metric data. These standards are helpful when informing the public on matters such as the status of the U.S.-NATO Weapons Interoperability/Standardization Program, when it enhances general understanding of defense activity, or when in keeping with the increasing use of metric dimensions in the United States.

Our basic defense policy also recognizes the voluntary aspect of the U.S. Metric Act. We consider the use of metric units in our activities consistent with operational, economical, technical and safety requirements.

I hope the above responds to your concerns.

Sincerely,

Caspar W. Weinberger

Appendix I (3 pages)

SUMMARY OF PROBLEMS WITH METRIC CONVERSION REPORTED BY THE U.S. GENERAL ACCOUNTING OFFICE

The U.S. General Accounting Office, the investigative agency for the Congress, has just completed a two-year study of whether the measurement system in the United States should be converted to the metric system.

The GAO findings have been submitted to Congress in a 757-page report and 85-page Executive Summary, entitled "Getting A Better Understanding of the Metric System -- Implications If Adopted By the United States" (CED-78-128, Oct. 20, 1978).

The GAO investigated use of the customary measurement system and any metric conversion efforts, as well as the practical effect of metric conversion, in every sector of American life. The Comptroller General's extensive report cites numerous problems and unresolved questions associated with national metrification policy or efforts that require Congress and the American people to look much more closely at any conversion to the metric system.

The GAO report includes the following findings and recommendations:

FINDINGS

1. The Metric Conversion Act of 1975 (15 U.S.C. 205) has conveyed to the public and business the erroneous impression that U.S. conversion to the metric system is national policy.
2. School programs teaching the metric system to elementary, high school, and college students -- many of them funded by the Federal Government -- have also had a promotional effect, and have contributed to the national movement towards metric conversion.
3. Several Federal departments and agencies -- notably the Departments of Transportation and Commerce -- have provoked widespread public opposition by attempting to mandate use of metric measurement on highway signs, in weather reporting, and through other promotional efforts, not in keeping with the intent of Congress.
4. The cost of metric conversion would be substantial -- in the billions of dollars -- which will result in higher consumer prices. Despite these substantial costs, the benefits of metric conversion are questionable in almost all areas.
5. The benefits ascribed by metric proponents -- for example, standardization and rationalization of measurement -- have taken place under the customary system.

6. U.S. economic activity and world trade have not been hampered by a dual system of customary and metric measurement, and there is no evidence that a solely metric system would be better.

7. GAO's case study of metric conversion in the beverage industry demonstrated that this has been largely detrimental to the consumer. Most wines and liquor converted to the metric system experienced unit price increases of up to 11 percent greater than those that did not convert.

8. Following extensive study, the GAO found that the following sectors of the U.S. economy see or can show no benefit from metric conversion, based upon current available data, and can continue to operate well under the current dual system:

   - U.S. world trade
   - U.S. engineering standards
   - Fastener industry (screws, bolts, nuts)
   - Transportation
   - Automobile dealers
   - Metal products industry
   - Rubber industry
   - Petroleum industry
   - Aerospace industry
   - Appliance industry
   - Paper industry
   - Surveying and Mapping
   - Labor
   - Weather reporting
   - Sports
   - Consumers
   - Government

9. The most ardent advocates of metric conversion appear to be certain government departments at the Federal and State level. educators and curriculum producers who would benefit from the change to a different system, and the automobile manufacture whose competitive situation would benefit from a measurement system consisting of more diverse and smaller units of measureme

RECOMMENDATIONS

1. The U.S. Metric Board should fully inform the American people that metric conversion is wholly voluntary, and refrain from promotional efforts in favor of metric.

2. The Office of Management and Budget should ensure that all Federal agencies abide by the intent of Congress that use of the metric system be wholly voluntary, and that they refrain from policy or promotional efforts that violate this intent. Also, the Federal Government must fully inform the public of the [illegible] and cost of any metric conversion.

3. The Departments of Transportation, Commerce, Health, Education and Welfare, and Treasury -- which have all been involved in metric conversion efforts that might be detrimental to the public -- must strictly abide by the Congressional intent of voluntary use of metric and re-evaluate any plans to become involved in metric conversion efforts.

4. The Secretary of Commerce should instruct the National Weather Service not to implement its conversion to metric weather reporting until there is a clear public demand or a firm national decision to convert.

5. The decision to continue with the current dual measurement system, predominated by customary measurement, or to convert to metric measurement, should be made by Congress.

[The General Accounting Office report, "Getting A Better Understanding of the Metric System -- Implications If Adopted by the United States"(CED-78-128, Oct. 20, 1978) can be obtained by writing to U.S. General Accounting Office, Distribution Section, Room 1518, 441 G Street, N.W., Washington, D.C. 20548]

* * *

Appendix J (3 pages)

"Metric Madness"

Over 150 Reasons for Not Converting to the Metric System

By J. W. Batchelder

©1981 by American Institute of Weights and Measures

Publisher's Preface

ADVOCATES OF THE metric system are fond of telling us that there are three very good reasons why we should abandon our familiar system of measurement and switch over to grams, liters, and meters. Supposedly, the metric system is more scientific, more precise, and certainly more up-to-date. To clinch the argument, the metricists point out that the entire world has gone metric, with only the United States and a handful of former British colonies still measuring away in terms of inches, quarts, and ounces.

Actually, none of these "facts" is true. First, the entire world has not gone metric. For very sound business reasons, much of world trade is still being conducted on a basis of customary measurement. Where the metric system has been forced upon people—notably in Britain and Canada—it is largely being ignored.

Second, the metric system is no longer scientific—if it ever was. Scientists today calculate with computers, which use the binary system (based on 2). The metric system, of course, is supposedly based on multiples of 10.

Third, the metric system is not precise. It has been changed so many times over the years (frequently to accommodate new scientific findings) that it is now almost a model of imprecision. To give but one example: The meter was originally defined as one ten-millionth of the surface distance from the Equator to the North or South Pole. However, scientists have discovered that not only does the world bulge at the Equator, but that its surface moves as a result of tides and earth tremors. Today, the meter is defined as the distance of 1,650,763.73 vacuum wavelengths of light emitted by an electron tube containing the rare gas krypton 86. So much for precision—and simplicity.

Finally, the metric system is by no means up-to-date. It has been with us, in one form or another, for almost 200 years. Since its inception in the 1790's, there have been many propagandists extolling the virtues of kilograms and centimeters. There have been many opponents of the metric system, too. The following is taken from *Men and Measures* by the English writer Edward Nicholson. The words were written in 1912, but they are just as pertinent today.

> Two systems are face to face throughout the West—the Imperial system resting on long custom and on convenience, and the Metric system on an assumption of science and on revolt against the past. It has been shown that the system which pretends to be the only scientific one, and the easiest, is a failure even in France. . . .
>
> The one makes men fit the measures however inconvenient; the other makes measures to fit those who have to use them. The one attacks; the other apposes a passive resistance.
>
> I have read many books and many articles and letters in newspapers and scientific periodicals advocating the compulsory use of the metric system, optional amongst us since 1897, but which no trade, industry or profession will adopt, and I have almost invariably found that the writers knew the metric system imperfectly, and

always that they knew their own very badly. I have found their advocacy illustrated by examples of problems in imperial weight and measure which showed defective instruction in the art of cyphering and supported by statements which were misleading and only to be charitably excused on the ground of ignorance. Too often opponents of their propaganda are sneered at as wanting in scientific knowledge, business experience, and common sense.

The propaganda of the metric system is effected from abroad by diplomacy, and from within by—

1. Calling it [the customary system of measurement] 'antiquated,' a term which might be applied to Law, to Religion, to Marriage, to Property, and other ancient institutions.

2. Calling it 'irrational,' when it has that great reason which comes from custom, convenience, improvement in recent times.

3. Calling it 'unscientific,' when it joins to popular convenience the option of decimalization, whenever that is found convenient, in addition to the alternate decimalization already established in several series.

4. Putting forward as current certain weights, such as the Troy pound, long ago obsolete.

5. Putting forward as legal measures trade-units, such as the cask, the sack, etc., used for convenience in trade, as much in metric countries as with us.

6. Putting forward, as necessary, sums and calculations which a decently taught schoolboy would laugh at.

7. Ignoring all that is convenient in our system and all that is inconvenient in the metric system.

8. Ignoring the satisfaction of the people of the United States with our system, even when retaining the old wine-gallon and corn-gallon.

9. Ignoring the resistance of the French people to

the metric system after a century of education in it and of police-constraint.

10. Urging us to follow the example of other countries that have adopted it, but omitting to find out whether the people of these countries . . . use it—so far as they do use it—otherwise than under compulsion. It is the governments of these countries, not the people, that have adopted it, always in the name of Science; and the day police-pressure were taken off, the old system would return, or, at the least, the decimal series would disappear.

11. Threatening the loss of foreign trade, when our trade weights and measures are so well understood by foreign manufacturers and merchants that they find no difficulty in placing their goods on our market, and are so well known that many foreign manufacturers find it impossible to use metric standards, those in England alone accepted in most of the markets to which British manufacturers are exported.

12. Calling opponents prejudiced, unprogressive, unscientific, wanting in business experience and common sense.

Such are the arguments used in the propaganda of a system which would make much of the past life of our country unintelligible, send most of its manufacturing machinery to the scrap-heap, dislocate trade for years and bring about in our country the same struggle that is still to be seen in France between the law and the people.

J. W. Batchelder, a Vermont engineer and author of *Metric Madness*, is well qualified to discuss the metric system. For over 50 years, he has studied the more bizarre aspects of metrics and found them wanting. His arguments—buttressed by facts, figures, and statistics—offer convincing proof that far from being the wave of the future, the metric system is really an outmoded thing of the past.

Mr. WALGREN. Thank you, Congressman Rudd. We certainly appreciate that perspective. I would invite you to stay with us this morning.

Next, Congressman McClory, and then we will have discussion with both members of the panel.

STATEMENT OF THE HONORABLE ROBERT McCLORY A REPRESENTATIVE IN CONGRESS FROM THE STATE OF ILLINOIS

Mr. MCCLORY. Thank you, Mr. Chairman.

I take quite a different view of this subject, as you probably are aware. I have been interested in the subject of metric conversion for many, many years, including the sponsorship of legislation which resulted in the Bureau of Standards studies which anteceded the development of the legislation in 1973 establishing the U.S. Metric Board.

The Committee on Science and Technology has always been a strong and consistent supporter of metric conversion. Successive chairmen, beginning with Chairman George Miller and Chairman Olin Teague, have been supporters of metric conversion in this country, and the current chairman, my good friend, Don Fuqua, has himself joined in supporting this important effort.

In my view the case for metric conversion and for a Federal role in that conversion is beyond dispute. The best evidence is the growing number of countries around the world, and the increased number of industrial companies within the United States, which are adopting metric measurements.

Thirty-seven years ago, as the world emerged from World War II, all of the English-speaking countries were predominantly nonmetric. In 1975, when Congress passed the Metric Act, the United States became the last of the industrial countries to take action to coordinate a conversion program designed to reflect the metric system of weights and measures.

I think it is significant that, as Mr. Fuqua noted in his press release, the small but important trade center of Singapore just last month announced that it, too, has completed the changeover to metric. As a result, the United States now finds itself in the company of Great Britain, Burma, Southern Yemen, Sierra Leone, and seven or eight other small nations as the only countries where metric conversion is not proceeding vigorously with the aid of strong Government leadership.

When it is said there are a large number of the Third World countries that have converted to metric, those must be the countries to which the gentleman from Arizona is referring, because all of the industrial countries of the world outside of the United States are either metric or in the process of converting to metric.

Japan, which went through a very difficult period with regard to metric conversion, went backward and forward and it was very expensive, very inefficient. It is that precise kind of dilemma which we do not want to find our country in.

Within the United States we have seen a growing number of companies, and in some cases entire industrial sectors such as the automobile industry, adopt metric standards. The list of companies has grown significantly since 1975, and it continues to grow. It includes both firms which have significant markets abroad and, yes, many companies which sell mainly in the domestic market.

There is a role in this process for both private organizations and Federal Government leadership. The American National Metric Council has served as an important private organization serving those companies which have joined in developing metric planning guides and metric standards. Their newsletters serve as an important channel of metric news.

As many of you know, I have been an early and consistent sponsor of legislation to encourage our Nation to adopt the metric system as our predominant standard of weights and measures. I would have preferred a far more vigorous program than that which was made possible under the 1975 legislation establishing the U.S. Metric Conversion Board, and I introduced that legislation which, however, did not succeed.

I feel that adoption of a target date or deadline for conversion of most parts of our economy and our public sectors would have been more beneficial, less expensive, more orderly, and indeed more successful than the essentially voluntary program which we have followed.

I should add that large elements of the industrial community in my congressional district of Illinois are and have been utilizing metric measurements for many years. Each succeeding year brings more converts to this great international system. Indeed, I have never received a report from any industry complaining that conversion to the metric system has had an adverse effect. On the contrary, many businesses large and small, have found new markets for their products following conversion to metric.

The U.S. Metric Board has played an important role, and it will continue to be needed to perform the coordination functions and the public education duties assigned to it under the Metric Act, Public Law 94-168. If anything, I believe that the Board should be more aggressive and should be strengthened for its important mission over the next several years. Its budget must, in my view, be continued at a level not less than that proposed by President Reagan last March so that it can carry forward the tasks begun in the early years of its life.

I would further venture to suggest that the experience of those initial years also suggests that your committee may want to strengthen the statutory mandate under which the Metric Board now functions. It would certainly not be an imperial decree which you would impose on the American people, but it would be thoughtful, constructive legislation enacted by the Congress, the Representatives of the people which have the intelligence and certainly the knowledge and background upon which to justify that kind of legislation.

I am aware that there have been extensive discussions within the Board about its proper role, and specifically whether advocacy of metric conversion can and should be part of that role. It may well be possible to clarify that mandate without abandoning the basic policy of voluntary participation under which metric conversion now takes place.

Mr. Chairman, I come before this committee today with a rather broad personal knowledge of the subject of metric conversion and with a full appreciation that, notwithstanding the difficulties, inconvenience, and sometimes the expense which metric conversion entails, we have benefited from the measure which was passed in 1975 and will continue to benefit by pursuing programs to coordinate a conversion to the metric system of weights and measures.

I share the committee's view of the broader implications of metric weights and measures for industrial innovation and productivity and for our trade position in world markets. There is a deficiency insofar as education today in the sciences, and if we are satisfied with the educational programs that we have now, as far as mathematics or science and the physical sciences are concerned, then of course we are going to be satisfied with the old English system.

But if we recognize that in order to continue our role of leadership in this world, then we have to enhance our scientific capability, we have to improve our educational programs, and we have to recognize that in order to conduct trade with the rest of the world to expand our foreign trade, we not only need an export trading company act but we likewise need to be dealing in standards, in weights and measures, which are compatible with the world markets.

So it seems to me that it would be a courageous but at the same time an extremely beneficial act for this Congress to not only provide for the funding—which I believe the President is supporting insofar as the continuation of the U.S. Metric Board is concerned—but likewise to consider actively improving this legislation to make it stronger and to make it more supportive of a program of metric conversion.

I would be pleased to answer your questions. Thank you very much.

[The prepared statement of the Hon. Robert McClory follows:]

STATEMENT OF THE
HONORABLE ROBERT McCLORY
METRIC CONVERSION OVERSIGHT HEARING
BEFORE THE
COMMITTEE ON SCIENCE AND TECHNOLOGY
FEBRUARY 8, 1982

I AM VERY PLEASED TO HAVE THIS OPPORTUNITY TO PARTICIPATE IN THE COMMITTEE'S OVERSIGHT HEARING ON THE PROGRESS OF METRIC CONVERSION.

THE COMMITTEE ON SCIENCE AND TECHNOLOGY HAS ALWAYS BEEN A STRONG AND CONSISTENT SUPPORTER OF METRIC CONVERSION. SUCCESSIVE CHAIRMEN, BEGINNING WITH CHAIRMAN GEORGE MILLER AND CHAIRMAN OLIN TEAGUE HAVE BEEN SUPPORTERS OF METRIC CONVERSION IN THIS COUNTRY, AND THE CURRENT CHAIRMAN, MY GOOD FRIEND, DON FUQUA, HAS HIMSELF JOINED IN SUPPORTING THIS IMPORTANT EFFORT.

IN MY VIEW THE CASE FOR METRIC CONVERSION AND FOR A FEDERAL ROLE IN THAT CONVERSION IS BEYOND DISPUTE. THE BEST EVIDENCE IS THE GROWING NUMBER OF COUNTRIES AROUND THE WORLD, AND THE INCREASED NUMBER OF INDUSTRIAL COMPANIES WITHIN THE UNITED STATES WHICH ARE ADOPTING METRIC MEASUREMENTS.

THIRTY-SEVEN YEARS AGO, AS THE WORLD EMERGED FROM WORLD WAR II, ALL OF THE ENGLISH SPEAKING COUNTRIES WERE PREDOMINANTLY NON-METRIC. IN 1975, WHEN CONGRESS PASSED THE METRIC ACT, THE U.S. BECAME THE LAST OF THE INDUSTRIAL COUNTRIES TO TAKE ACTION TO COORDINATE A CONVERSION PROGRAM DESIGNED TO REFLECT THE METRIC SYSTEM OF WEIGHTS AND MEASURES. I THINK IT IS SIGNIFICANT THAT, AS YOU NOTED IN YOUR

PPRESS RELEASE, MR. CHAIRMAN, THE SMALL BUT IMPORTANT TRADE CENTER OF SINGAPORE, JUST LAST MONTH ANNOUNCED THAT IT, TOO, HAS COMPLETED THE CHANGEOVER TO METRIC. AS A RESULT, THE UNITED STATES NOW FINDS ITSELF IN THE COMPANY OF GREAT BRITAIN, BURMA, SOUTHERN YEMEN, SIERRA LEONE, AND 7 OR 8 OTHER SMALL NATIONS AS THE ONLY COUNTRIES WHERE METRIC CONVERSION IS NOT PROCEEDING VIGOROUSLY WITH THE AID OF STRONG GOVERNMENT LEADERSHIP.

WITHIN THE UNITED STATES, WE HAVE SEEN A GROWING NUMBER OF COMPANIES, AND IN SOME CASES ENTIRE INDUSTRIAL SECTORS SUCH AS THE AUTOMOBILE INDUSTRY, ADOPT METRIC STANDARDS. THE LIST OF COMPANIES HAS GROWN SIGNIFICANTLY SINCE 1975, AND IT CONTINUES TO GROW. IT INCLUDES BOTH FIRMS WHICH HAVE SIGNIFICANT MARKETS ABROAD AND, YES, MANY COMPANIES WHICH SELL MAINLY IN THE DOMESTIC MARKET.

THERE IS A ROLE IN THIS PROCESS FOR BOTH PRIVATE ORGANIZATIONS AND FEDERAL GOVERNMENT LEADERSHIP. THE AMERICAN NATIONAL METRIC COUNCIL HAS SERVED AS AN IMPORTANT PRIVATE ORGANIZATION SERVING THOSE COMPANIES WHICH HAVE JOINED IN DEVELOPING METRIC PLANNING GUIDES AND METRIC STANDARDS. THEIR NEWSLETTERS SERVE AS AN IMPORTANT CHANNEL OF METRIC NEWS.

AS MANY OF YOU KNOW, I HAVE BEEN AN EARLY AND CONSISTENT SPONSOR OF LEGISLATION TO ENCOURAGE OUR NATION TO ADOPT THE METRIC SYSTEM AS OUR PREDOMINANT STANDARD OF WEIGHTS AND MEASURES. I WOULD HAVE PREFERRED A FAR MORE VIGOROUS PROGRAM THAN THAT WHICH WAS MADE POSSIBLE UNDER THE 1975 LEGISLATION ESTABLISHING THE U.S. METRIC CONVERSION BOARD. I FEEL THAT ADOPTION OF A TARGET DATE OR DEADLINE

FOR CONVERSION OF MOST PARTS OF OUR ECONOMY AND OUR PUBLIC SECTORS WOULD HAVE BEEN MORE BENEFICIAL, LESS EXPENSIVE, MORE ORDERLY, AND, INDEED, MORE SUCCESSFUL THAN THE ESSENTIALLY VOLUNTARY PROGRAM WHICH WE HAVE FOLLOWED.

I SHOULD ADD THAT LARGE ELEMENTS OF THE INDUSTRIAL COMMUNITY IN MY CONGRESSIONAL DISTRICT OF ILLINOIS ARE AND HAVE BEEN UTILIZING METRIC MEASUREMENTS FOR MANY YEARS. EACH SUCCEEDING YEAR BRINGS MORE CONVERTS TO THIS GREAT INTERNATIONAL SYSTEM. INDEED, I HAVE NEVER RECEIVED A REPORT FROM ANY INDUSTRY COMPLAINING THAT CONVERSION TO THE METRIC SYSTEM HAD AN ADVERSE EFFECT. ON THE CONTRARY, MANY BUSINESSES, LARGE AND SMALL, HAVE FOUND NEW MARKETS FOR THEIR PRODUCTS FOLLOWING CONVERSION TO METRIC.

THE U.S. METRIC BOARD HAS PLAYED AN IMPORTANT ROLE, AND IT WILL CONTINUE TO BE NEEDED TO PERFORM THE COORDINATION FUNCTIONS AND THE PUBLIC EDUCATION DUTIES ASSIGNED TO IT UNDER PUBLIC LAW 94-168. IF ANYTHING, I BELIEVE THAT THE BOARD SHOULD BE MORE AGGRESSIVE AND SHOULD BE STRENGTHENED FOR IT'S IMPORTANT MISSION OVER THE NEXT SEVERAL YEARS. ITS BUDGET MUST, IN MY VIEW, BE CONTINUED AT A LEVEL NOT LESS THAN THAT PROPOSED BY PRESIDENT REAGAN LAST MARCH SO THAT IT CAN CARRY FORWARD THE TASKS BEGUN IN THE EARLY YEARS OF ITS LIFE.

I WOULD FURTHER VENTURE TO SUGGEST THAT THE EXPERIENCE OF THOSE INITIAL YEARS ALSO SUGGESTS THAT YOUR COMMITTEE MAY WANT TO STRENGTHEN THE STATUTORY MANDATE UNDER WHICH THE METRIC BOARD NOW FUNCTIONS.

I AM AWARE THAT THERE HAVE BEEN EXTENSIVE DISCUSSIONS WITHIN THE BOARD ABOUT THE PROPER ROLE, AND SPECIFICALLY WHETHER "ADVOCACY" OF METRIC CONVERSION CAN AND SHOULD BE PART OF THAT ROLE. IT MAY WELL BE POSSIBLE TO CLARIFY THAT MANDATE WITHOUT ABANDONING THE BASIC POLICY OF VOLUNTARY PARTICIPATION UNDER WHICH METRIC CONVERSION NOW TAKES PLACE.

MR. CHAIRMAN, I COME BEFORE THIS COMMITTEE, TODAY, WITH A RATHER BROAD PERSONAL KNOWLEDGE OF THE SUBJECT OF METRIC CONVERSION AND WITH A FULL APPRECIATE THAT, NOTWITHSTANDING THE DIFFICULTIES, INCONVENIENCE AND SOMETIMES THE EXPENSE WHICH METRIC CONVERSION ENTAILS, WE HAVE BENEFITED FROM THE MEASURE WHICH WAS PASSED IN 1975 AND WILL CONTINUE TO BENEFIT BY PURSUING PROGRAMS TO COORDINATE A CONVERSION TO THE METRIC SYSTEM OF WEIGHTS AND MEASURES.

I SHARE THE COMMITTEE'S VIEW OF THE BROADER IMPLICATIONS OF METRIC WEIGHTS AND MEASURES FOR INDUSTRIAL INNOVATION AND PRODUCTIVITY AND FOR OUR TRADE POSITION IN WORLD MARKETS. I WOULD URGE THE COMMITTEE TO MAINTAIN THE SUPPORT FOR THIS EFFORT WHICH IT HAS GIVEN SO EFFECTIVELY IN YEARS PAST.

Mr. **WALGREN**. Thank you.

Point, counterpoint; it is to be pointed out both of these gentlemen are Republicans. I almost wonder how to proceed. I really appreciate such a strong statement.

Let me just ask: We have apparently spent several million each year on this effort. Could each of you just assess in your view the value that you see in having spent the past moneys that we have spent up to this point?

I would like to start with Congressman McClory, if I could.

Mr. **McCLORY**. Well, I am sure that the coordinating role that the Metric Board plays, its ability to provide information for use by the various elements of our private sector and the educational community, has been significant. I know that I have done a little speaking myself to school groups with regard to metric, which is a very exciting subject in the classroom. Young people are extremely interested in it.

I have been helped by the Metric Conversion Board in that connection.

I do not think we have fulfilled what are the goals, the potential of this Metric Conversion Board, but I think they have been harassed, they have been discouraged by threats that they are exceeding their bounds and they have been very, very, I think, very concerned about this role of advocacy and tread almost timidly, which I think is unfortunate. But I think that is because we have been timid in our legislative mandate. That is why I would like to see a target date and language in the legislation I sponsor; I said we should become a predominantly metric system.

The reason I say that and do not say we should be entirely metric is that there are some antiquated units of measure that we use in lands, for instance, land measurements by rods, we use furlongs in certain documents, things like that. We do not want to outlaw those things, but at the same time we want to recognize they have a very limited, almost historic significance, and not a current significance.

I think the principal road block on the Board is somebody by the name of Hannigan, who is a labor union leader, and the labor unions almost fouled up our legislation because they want us to have a big subsidy program to subsidize tools for workers, all kinds of things.

We did not want to get into another big Federal spending program, so we avoided that, but the presence of Mr. Hannigan I feel has been a deterrent to a more positive attitude on the part of other Board members.

Mr. WALGREN. Let me ask one other question and then turn to Congressman Rudd with both questions.

The second question is, can it happen voluntarily? Do you feel that we can make a reasonable progress in your view voluntarily?

Mr. MCCLORY. I do not think so. I think if we abandon this coordinating role of the U.S. Metric Conversion Board, you are going to find that these pockets of resistance, these small revolts, impede progress toward conversion.

I might say that one big industry in my district contacted me a couple of years ago, about 2 years ago, and said we have hired a consultant and we find that conversion to the metric system is going to cost us something like $5 million. I said, well, I can't understand that. Why do you say that?

He said you will have to come out and visit. So I went out, visited with their board, all their executive officers. They took me out into their plant and showed me. They said, we have all these pallets, these pallets are developed in foot measurements and if we have to convert all of those to metric measurements, it is going to cost us millions of dollars.

I said, why do you want to convert the pallets? They said, well, that is what we think that the metric conversion would do. I said no, just put your metric items, put them on the same pallets, don't bother changing those. If they wear out, then you can convert them. But they had spent a lot of money hiring a consultant to tell them how expensive it was going to be and the expense was all ephemeral; it did not exist at all.

The experience has been that these bugaboos about the terrible expense in metric conversion just disappeared. They are not real at all. But for instance, for us to deal in the European Common Market, we had better deal in their measurements or we are not going to deal.

I have a big fasteners industry in my district. They were tough to deal with. But the fasteners industry, if you think about screws, nuts, bolts having to convert to standards fitting in with the European Common Market, you have a big problem. But they measured up to the problem. They have to. Otherwise, they lose the market.

I have a big pharmaceutical industry which has always been metric. As a matter of fact, one reason why I have been interested in this, the chairman of the American Metric Association was one of my constituents, and the home of this organization was in my district. That got me stirred up in the early days. But I am satisfied that the need is there, that without legislation, without support for this Metric Conversion Board, we can slip back and we can slow down and we can drift along; it is going to be expensive, inefficient, and very detrimental to our whole economy, our whole society, especially to our export trade potential.

Mr. WALGREN. Thank you, Mr. McClory.

Congressman Rudd, may I ask you the same two questions then.

Mr. RUDD. I think we have gone a little bit afield in the two questions. But let me just address a portion of this with regard to the difficulty of our American system of measurement.

The American system of measurement is used and developed by long usage—something that people feel comfortable with. It is not something that has been imposed upon them and requires reeducation.

For example, the definition of a meter—the metric system's basic length—has been changed a number of times. The meter was originally defined as one ten-millionth of the surface distance from the Equator to the North or South Pole. This was changed by scientists who discovered that the world bulges at the Equator, and the surface moves as a result of tides and earth tremors.

As a result, the meter was redefined as the distance of 1,650,763.73 vacuum wavelengths of light emitted by an electron tube containing the rare gas krypton 86. So much for simplicity in metric.

We only use rods and leagues and this sort of thing when it becomes convenient. The most logical measurement unit with regard to linear measurement that I can think of is the nautical mile. The nautical mile is a length of one minute of one degree latitude or longitude as we divide the Earth into distances.

The cost by imposing this on the people is enormous. The House of Representatives is the people's House, we refer to it all the time; we are representing the people of this Nation. We say the people are the Government of the Nation. If the people do not want something to be imposed on them, we hope they still have the influence to tell their Government representatives that it should not be governed.

The workers in the field who will have to do this day in and day out—they are the people who should decide what we need and what we do not need. When we talk about imposing a system of measurement which was developed in France and, just because it came from France or Europe, indicating that it is a better system culturally or otherwise, this begs the fact that our great Nation has become great because we have the type of government we have. This type of government never existed anywhere on earth before ours came along in the form that it has—respect for the individual, and government by the people.

The people use what they need in order to provide for whatever is best for their lives, and our free market system will determine that. So to impose this system would be against what our Government stands for in the first place. And if it comes naturally, that is fine.

Let me say, Mr. Chairman, that I lived for a number of years abroad, carried a diplomatic passport, and lived with the metric system in many countries in Latin America where it is not used totally. But these countries and the European countries who buy our product do so because we have the best product. They conform to what we need.

For 120 years the law has been that anyone who wishes to use metric can do so. We have a useful system. If the people who buy our better products want that product in a metric system, the people who manufacture it are more than willing to provide it to them and it does not cost any extra to do so. But to impose the system on our people indicates that these people do have to change their tools—carpenters and electricians have to buy new tools.

No wonder these people who are going to have the system imposed on them insist that the Government should pick up the tab. They can't afford it. The cost would be prodigious.

We talk about landowners, the recorders in counties, municipalities, this sort of thing. This means at great expense they would have to change their records, the courts would have to change their records. I am talking about mandatory imposition, not voluntary imposition.

Again I would say that the American National Metric Council does the job that the Board was instructed to do and has not done.

I hope that you will take a look at the pages 18-A and B of my statement, which will indicate what the expense and the cost really would be.

Does that address both questions?

Mr. **Walgren**. Yes, it does. I can certainly see the direction of your answer.

Let me recognize my colleague from New Mexico, Mr. Skeen.

I apologize for having gone on in my own involvement here. We do have a full measure of witnesses that have been involved in this area, nongovernmentally. I think I have imposed on their time.

Mr Skeen.

Mr. **Skeen**. Thank you very much.

Thank you, Mr. Chairman, for the opportunity to sit in that august chairman's chair. We were going to take up the NSF budgeting while you were gone. [Laughter.]

I want to compliment you, too, on the way you handled my two Republican colleagues. It is always better to have a Democrat hold the chair when you have two Republicans argue with each other, and the reverse goes as well for the Democrats. Because if you had to say grace or give an invocation, we do not like to have to lower our eyes before one another, being in an argument.

I will get on with the business here, Mr. Chairman.

As I gather this argument, being an engineer by training and being somewhat out of it for a number of years, during my education as an engineer we dealt with several systems of measurement that you had to learn to adapt to. Physics was done in the English system, chemistry is done in the metric system, surveying was done in anybody's system, whoever traditionally had done the measurements.

I always understood our greatest argument for going metric was that it was a simpler approach, more accepted throughout the scientific community, not nation-by-nation particularly, but mostly by the scientific community.

As I gather it, the big argument between Mr. McClory and Mr. Rudd, for both of whom I have great respect, is interpretation of advocacy and education insofar as the Metric Board's role in this thing. Where does that advocacy end or education end and advocacy begin?

As I gather it then, Congressman Rudd is concerned about whether or not they have overstepped their bounds, as stated in the statutes. They have become more of an advocate and a group that is overstepping the voluntarism promoted in the statute.

Is that your feeling?

Mr. Rudd. I would say to my distinguished colleague from New Mexico that that is not basically what we are talking about.

What we are talking about is the imperial imposition by law of the metric system upon the people of the United States when they are opposed to it and the polls show that they are.

The immense cost that would be involved by imposing it imperially is something that we do not need in our economy, especially at this time. But the fact that it would be imposed imperially is absolutely un-American as far as I am concerned.

Our Constitution provides for our Government to be a government of, by and for the people, and this goes against the spirit of that. I have no objection to metrication; wherever you want to use it you can use it. But I think it is cumbersome.

We talk about how cumbersome our system is, which has created the greatest success, scientifically and industrially, the world has ever known. When you speak in use of anstroms, joules, newtons, this is even more difficult than what may be said on the other side.

An angstrom is used to measure the length of light waves and equals 100 millionths of a centimeter.

A joule is a unit of energy equal to 10 million ergs or that amount of energy expended in 1 second by a current of ampere at a potential of 1 volt.

A newton is force which, applied for 1 second, will give a velocity of 1 per second to a 1-kilogram mass. And the unit of mass for the SI, Systemé Internationale is the kilogram and it is not the gram. This is because the argument by many that the gram, which is 1/1,000 of a kilogram—equal to about 2.2 pounds, which I used to have to deal with at the meat market—is simply too small for practical use, which is one of the major drawbacks of the metric system.

It does not make sense to go through the immense trouble and expense of converting to a foreign system simply to please the minority of bureaucrats, educators, and technicians—who themselves are very much divided on the benefits of each system.

These are some of the things basically I am opposed to because I think it does not provide the will of the people to be stated openly; it is an attempt to impose this system on them and the metric system has not proved itself to be better in any way, and we have been getting along very well with the dual system of measurement. That is why I would like to have the Board stopped where it is, because it is not doing the job it was intended to do in the first place, and probably it cannot do because the Board was established for the prometric people wanted something done about metrication.

They hoped this would do the job—the establishment of the Board. Even though the law has indicated it is called metric conversion—and there was a lot of argument on this committee at that time about whether they could go ahead and use that terminology because it did not address itself to the voluntary nature of the whole problem, metrication is entirely voluntary. I think that the Board is hamstrung because it was intended to be imperial in its beginning and it is not able to be imperial and still abide by the law, which it has not done very well, I might add.

Mr. McClory. I think the Board has been very restrained in what they have done.

They have had a very limited mandate really. I think their mandate should be stronger. I am reconciled to the fact that the legislation was passed, but I think within the limited mandate they have done an outstanding job. I cannot conceive of our being without at least what we have now in the Metric Conversion Board, that is a coordinating agency, maybe some leadership.

I think this leadership should not be confused with advocacy. I think the leadership should be considered as identifying the prominent role that metric has in the international community and in the scientific community and in education and the opportunities for utilizing it, as the gentleman from New Mexico said.

It is regarded as being a simpler system, which it is. It is far simpler for the student of mathematics to deal in units of ten than it is in units of 3 to 12, and so on. So this kind of advantage of the metric system should certainly be pointed out by someone and the Metric Conversion Board is trying to do that; not trying to force anything on anybody, but being there to assist in helping people to utilize the system, if they decide to use it, that is.

Mr. Chairman, I am very embarrassed but I do have an appointment that I think I have to keep, if you could excuse me.

Mr. Skeen. Thank you for being so kind to answer our question. I appreciate you both being here.

Mr. McClory. Thank you.

Mr. Walgren. Thank you, Mr. Skeen.

I appreciate the testimony from both of you, and we should at this point move on to the other witnesses.

Mr. Rudd. Mr. Chairman, I appreciate the opportunity for being here with you today.

On the simplicity argument, I might add that the decimal system has long been used within our American system of measurement and I think in the definitions that I gave you, the angstrom, et cetera, it is pretty hard to apply the decimal system to that. The decimal system is something that is easily usable; as a matter of fact Genghis Khan invented it for military use and it has served the military purposes since then. We use the decimal system wherever we can in this country.

But I do appreciate the opportunity to be with you and I wish you great wisdom in making a decision on the immense job, the tremendous responsibility you have.

Thank you very much.

Mr. **Walgren**. Thank you. It is going to take great wisdom.

While they come in different capacities, I would like to call both Robert Kurtz, chairman of the board of the American National Metric Council, accompanied by Mr. George Meixel, the first vice chairman of the National Metric Council, along with Mr. Thomas Rowan.

If Mr. Rowan would come to the table, it might facilitate matters. Mr. Rowan is with the National Council of Teachers of Mathematics and coordinator of mathematics of Montgomery Schools.

These are two sort of separate aspects. If Mr. Kurtz and Mr. Meixel are here, we will proceed with you gentlemen first and then turn to Mr. Rowan.

I think it is indicative of what kind of an area this is, the interest and discussion both from the Senator and from the two Congressmen. Perhaps it is helpful to air those things in this setting rather than take up the time of the floor of the House of Representatives or elsewhere. But it is really a hallmark of the whole metric question that people feel so strongly and so absolutely about it.

We would appreciate your views on the current status of metric conversion and where you feel this issue now lies and should go. Any written statement you have will be made part of the record. Please either summarize or proceed as you feel most effective.

Mr. Kurtz.

STATEMENTS OF ROBERT B. KURTZ, CHAIRMAN OF THE BOARD, AMERICAN NATIONAL METRIC COUNCIL, AND GEORGE D. MEIXEL, FIRST VICE CHAIRMAN, AMERICAN NATIONAL METRIC COUNCIL

Mr. **Kurtz**. Thank you, Mr. Chairman.

My name is Robert B. Kurtz, and I am the chairman of the board of directors of the American National Metric Council, a position I have held since March 1980. I am also a senior vice president of the General Electric Co.

With me on my right is Mr. George D. Meixel, currently the first vice chairman of ANMC. Mr. Meixel has been a member of the ANMC Board of Directors since 1976 and I anticipate that at the meeting of the board tomorrow Mr. Meixel will be elected chairman. He is also the manager of the Washington office of Ingersoll-Rand Co. Both Ingersoll-Rand and General Electric were charter subscribers to ANMC.

Also with me in the audience is Mr. David Gorin, the president and chief executive officer of ANMC.

We appreciate the opportunity to appear before this committee today and are pleased to present our comments on the status of metric conversion and the Gvernment's role in metric transition.

The American National Metric Council was founded by the American National Standards Institute in 1973 to assist the private sector in dealing with the issue of metric measurements in a traditionally inch-pound America. The private sector created ANMC to provide a structure for planning and coordinating metric transition issues and to gather and disseminate information on metric activities.

ANMC is similar in nature to many other trade associations. It is a nonprofit, privately funded organization governed by a board of directors of our members, and we provide many of the same kinds of services and programs as most other associations. For example, in the area of information services, ANMC publishes a biweekly newsletter, provides over 30 special publications, sponsors a national annual conference, convenes special seminars and workshops, and responds to specific informational requests from our members.

We conduct a government affairs program which monitors and reports on Federal, State, and local government metric activities for our members, and represents their views to the public on occasions such as this.

But the most important function of ANMC, and the fundamental reason for its existence, is voluntary metric planning and coordination. ANMC is primarily an extensive committee structure. Each committee provides an individual forum for each industry sector for the discussion of common metric conversion-related issues and concerns. The committees also serve as the basis for consensus mechanisms in decisionmaking within their particular industries.

ANMC, though similar to other associations, is nevertheless different from the typical trade association. Most trade groups define their domain as a specific, well-defined industry and deal with any and all issues affecting, or possibly affecting, that industry.

ANMC deals with just one special issue, metric conversion, but we serve as the specialists for all the different industries and professions in our economy that wish to participate in our activities.

Because of the uniqueness of ANMC, our committee structure is quite different from most groups. Instead of having a committee structure revolving around various issues, our committees revolve around any and all industries of the economy and how metric conversion affects them.

Today over 50 different industry sector committees operate under the ANMC umbrella, each with the single mission of addressing the issue of metric transition for its business segment. Each committee is representative of a specific industry and typically includes representation from manufacturers, suppliers, and users, as well as other concerned parties such as government and labor. These committees perform services for their industries such as identifying issues, benefits, and problems of going metric; developing conversion plans of broad use to all; examining standards, metric units, and legislative needs, and evaluating conversion timing options.

In addition to the industry sector committees, the ANMC structure also provides for participation in metric decisionmaking from special interest areas in our economy, specifically labor, consumers, small and large business, and government. It is our policy to assure that these groups have a role in decisionmaking on metric. The ANMC planning structure, the combination of industry groups and special interest concerns, form the foundation of the ANMC consensus mechanism which is used for arriving at all industrywide decisions. The structure, as properly administered and monitored by the ANMC Steering Committee, is a democratic and effective vehicle through which voluntary metric conversion, where desired, can be coordinated by the private sector.

There may be interest in regularly assessing the status of metric conversion activity and progress. The U.S. Metric Board has conducted statistical surveys of the Fortune 1000 firms; independent studies have been undertaken on specific business segments, exploring statistics and evaluating attitudes.

ANMC acknowledges the potential value of statistical status reporting on such things as the number of metric products being manufactured and percent of sales of metric products. However, the expense of gathering truly reliable data is quite high and exceeds ANMC's capability. When funding for such studies is available and particularly when our subscribers indicate a need for the information, ANMC will attempt to collect the data. In the meantime, ANMC continues to report status based on the level of planning activity by individual industry committees.

I present the following specifics which will give you some basis on which to draw your own conclusions regarding status:

One, between 1973 and 1981 ANMC's budget of approximately $600,000 remained relatively constant, with inflationary adjustments, despite the severe changes in the economy. Therefore, one might conclude that the members' interest in metric has not varied. On the other hand, sales of publications and attendance at ANMC's annual conferences are down.

Two, ANMC maintains a subscriber base of over 1,000 members, which includes both consumer- and industrial-oriented companies; labor, associations, libraries, government agencies, and individuals. This figure, too, has not varied greatly in recent years. More than 1,500 people are involved in various ANMC planning activities.

Three, over 50 different industry committees have been organized to address metric issues: 26 of these committees have been active this past year or have completed their deliberations—17 have been actively planning for their industry's metric transition and use and 9 others have been investigating metric issues; 8 new sector committees have been established in the past year; 10 committees have recently completed their issue identification investigations and are in a holding pattern awaiting action in related sectors before continuing to the planning phase; and 7 committees have yet to begin any meaningful activity.

Four, 21 different industries have developed, or are developing, metric planning aids and documents such as metric unit guides, training manuals, suggested or preferred sizing guides, and logs of metric standards and parts.

The written submission to this committee includes details of the status of each ANMC sector committee.

Some suggest that the best way to assess status is to look at the marketplace. It is the best judge of status and we are encouraged by the growth there of metric use.

Private industry established ANMC in 1973 because of a need for a central forum for the discussion of metric conversion. ANMC fills this need and service for its subscribers and will continue to do so as long as industry has a need for a central focus on metric planning.

In preparing my comments to you this morning, I reviewed what representatives of ANMC had said before this committee on previous occasions.

Our last appearance before you took place on November 26, 1979, and, while more than 2 years have passed, much of what we said then still stands today. The views of the American National Metric Council in regard to the role of the Federal Government as U.S. industry proceeds toward a metric transition are basically unchanged from those which we presented in 1979. ANMC continues to support the need for Government participation in metric conversion planning and coordination.

I will state at the outset that ANMC believes that the decision to continue or curtail the U.S. Metric Board is a decision to be made by the Government in light of its priorities and programs. ANMC believes that there is a role that the Government may play in assisting a voluntary conversion to the metric system. What that role should be of course, must be determined by Congress and the administration.

ANMC will seek to establish a close relationship with any Government office or body that might succeed the U.S. Metric Board and would, of course, continue such a relationship with the Board should it be retained and should the U.S. Metric Board desire such a relationship.

In late 1980 we surveyed our members to determine how they viewed the respective roles of the private and public sectors in metrication, and to assist in determining an ANMC policy on the matter. The results of that survey clearly indicated that there are distinct roles which now represent ANMC's position in this regard.

Overwhelmingly, that part of the private sector represented by ANMC believes that voluntary conversion is the only course of action that should be followed in the United States. Our membership would strongly oppose any attempts by the Government to force conversion through legislative mandate or agency regulation. The private sector wishes to dictate the direction and pace of conversion in a manner that will be cost effective, economically beneficial, and in the best long-term interest of both the specific industry and the United States as a whole.

Now, having said that, let me add that the private sector recognizes that the complexity of conversion, coupled with the strong influence of Government at various levels in the marketplace, make it appropriate that there be some Federal Government involvement in support of the private initiatives. I would like to define the Government role as ANMC sees it.

First, the administration needs to clarify its understanding of the U.S. metric policy as stated in the Metric Conversion Act of 1975. The Government has contributed to public confusion about metric conversion by issuing conflicting reports. The 1971 study by the Department of Commerce concluded that the United States should go metric; the 1978 report by the General Accounting Office cited high costs and limited benfits. A clarification by the administration relative to the use of metric in the United States would be desirable.

Second, it would be helpful for the Federal Government to continue its responsibility for coordination between various government agencies on the Federal and State levels and between public and private interests. Government, as a major customer of the private sector, is an interested and affected party to private conversion initiatives and, like all interested parties, needs to be involved in the specific conversion planning activity along with the private sector.

In addition, the myriad of Federal and State agencies requires leadership to assure that Government position on conversion issues is coordinated and cohesive. The private sector looks to the Federal Government to provide legislative and regulatory relief to permit the private sector to carry out its voluntary conversion plans.

The final role we see for the Federal Government is in the area of public education and awareness. If this administration believes that increased use of metric in the United States may be inevitable in light of world trends, and if this administration and Congress support the private initiative in this area, then the Government should make an effort to assist in educating the public about metric and support efforts to build a more receptive climate among Americans.

Let me summarize our position.

One, the Government's decision on the question of increased metric use should be clearly stated.

Two, there is a helpful role that the Federal Government can play to assure that proper coordination takes place between Federal agencies, between the States and the Federal level, and between the Government agencies and the private sector.

And three, the Government should help develop public awareness and education.

ANMC is ready to provide necessary and proper assistance to this committee and to offices and individuals with the Federal Government and we would be pleased to provide further information and respond to your questions.

[The attachments to the prepared statement of Mr. Kurtz follow:]

ANMC Sector Committee Status Update #7

1981-11-09

Legend

ANMC Staff
1—Robert Peterson
2—[illegible]
3—Cheryl Cummins

Italics indicate change in status from previous report.
For information on coordinating and advisory groups not shown in this report, contact Cheryl Cummins at (301) 530-8333

Activity Description
L—low
M—medium
H—high
O—organizational
I—investigational
P—planning
C—conversion

committee year organized	program staff	activity level	nature	documents subsectors comments	cmte members	government participation
1.01 Metals 1974	3	M	P	Doc: Status Report for Metric Conversion in the Metals Sector, 1979-04; Metal Sector Conversion Plan, first draft, 1978-07 Comment: Sector reviewed and commented on draft DoD metric plan; meeting planned for 1981-11-19 at Ryerson Service Center with other ANMC committees to discuss preferred metric sizes for steel and fasteners.	35	Naval Air Dev Ctr; Naval Ship Eng Command; Def Indus Supply Ctr
1.02 Chemicals & Allied Products 1974	3	H	C	Doc: Chemicals Going Metric, 1979-03; Chemicals Sector Conversion Plan, endorsed *1981-10-21;* Final List for Suggested Metric Package Sizes for Industrial Chemicals, 1979-08; Preferred SI Units for the Chemical & Allied Products Industries, 1980-05; 1980 Annual Report and Projected Plans for 1981, FPLA Position Paper Sub: Units of Measure; Standards and Specs; Legislation and Regulation; Planning; Process Equip. & Packaging; Information; Gov't Liaison; Membership Comment: *Sector approved conversion plan on 1981-09-16; plan endorsed by ANMC Steering Committee on 1981-10-21; committee will sponsor product line seminar on 1981-11-17 in the area of white pigment* TiO_2	81	Defense Logistics Agency; Naval Ship Eng Ctr; Defense General Supply Ctr
1.03 Petroleum & Natural Gas 1974	3	*M*	P	Doc: Endorsed Conversion Plan for Retail Motor Fuel Dispensers, 1980-03-26; Sector Conversion Plan, first draft, 1978-12; Retail Motor Fuel Dispenser State Conversion Deadline Status, 1981-01; 1980 Annual Report and Projected Plans for 1981 Sub: Planning; Units; Standards Comment: Sector has approved API 2564 as units guide; considering methods of continuing work on full conversion plan; participated in discussions regarding uniform conversion factor/rounding procedure for liter-gallon price equivalents.	48	DOE; DOD: Defense Fuel Supply Ctr; NAVSEA; NBS; Naval Air Systems Command
1.04 Lumber & Wood Products 1974	3	L	I/P	Doc: Lumber & Wood Products Metric Planning Package, 1978	18	Forest Service, USDA; Defense Constr Supply Ctr; NACSEA; NAVFAC
1.05 Paper & Allied Products 1977	3	L	O		40	Defense General Supply Ctr
1.06 Mixed & Mineral Products	3	inactive				
1.07 Forestry 1979	3	H	I/P	Doc: Selected Metric Units in Forestry, 4th draft, 1981-01; 1980 Annual Report and Projected Plans for 1981 Sub: Planning; Measurement Units; Scaling Measurements; Inventory & Mapping Measurements; Forest Mgmt. Practices; Measurement & Equip; Legislation; Public Awareness & Training; Urban Forestry. Comment: *All subsector planning activities under way; first draft of conversion plan expected by mid-1982. Units Guide to be included in January 1982 SAF* Journal of Forestry article.	27	DOI, Div of Forestry; US Forest Service; TVA
2.01 Aerospace 1975	3	H	I/P	Doc: Sector Conversion Plan, 4th Revision, 1978-11, plan revision in process; AIA publication "Aerospace Metrication: 1980 Status & Outlook;" PMP/SLED Log, 1981-07 Sub: Planning; Aircraft Oper; Engineering; Parts, Materials & Processes; Product Operations. Comment: Sector has completed projects in the areas of computer software conversion and small business conversion, other projects under way. Sector participated in DoD metric seminars & workshops 1980-11-18/20, and reviewed and commented on DoD draft metric plan. Sector will review FAA metric plan in late 1981.	50	NASA; Naval Air Systems Command; AFSC/[illegible]; NAVAL Air Eng Ctr; USAF; DOD; FAA; Defense Matl Spec & Standards Office; DOT; US Army Missile Command; Defense Industrial Supply Ctr; NAVAIR
2.02 Rail 1975	3	inactive				
2.03 Maritime 1974	3	inactive				

committee year organised	program staff	activity level	nature	documents subsectors comments	cmte members	government participation
2.04 Highway Vehicles 1974	1	L	P	Doc: Sector Conversion Plan, draft, 1978-02 Comment: *Sector participating in 1981-11-19 meeting at Ryerson Service Center with sectors 1.01, 2.05, and 2.06 to discuss preferred metric steel and fastener sizes.*	71	EPA; DCSC-SSD; NHTSA; FHA; GSA-National Automotive Ctr; ICC; NACFAC; DOT; GAO; US Army Material Command
2.05 Construction & Agricultural Equipment 1975	3	H+	P	Doc: Metric Transition Planning Summary, 1978-12; Sector Conversion Plan, draft 1978-03; 1980 Annual Report and Projected Plans for 1981, *Suggested Preferred Sizes and Compositions for Metric Steel, 1981-10; Suggested Preferred Sizes for Metric Fasteners, 1981-10* Sub: Planning; Metric Materials; Fasteners Comment: Metric Transition Planning Summary being updated for publication in 1981. *Sector position papers on preferred suggested sizes of metric steel and fasteners finalized and endorsed by ANMC Steering Committee, 1981-10-21; meeting scheduled 1981-11-19 at Ryerson Service Center in conjunction with sectors 1.01, 2.04 and 2.06.*	41	US Army-Tank Automotive Command; US Army Mobility, Equipment, R&D Command; NAVFAC
2.06 Machinery 1974	1	H	I	Doc: *"Metric Changeover Guide for Machinery Manufacturers" published for review and comment 1980-08-07*, 1980 Annual Report and Projected Plans for 1981 Task Groups: Standards & Units of Measure; Materials & Components, Costs & Training Comment: *Sector will meet 1981-11-18 to discuss prioritization of DoD specifications and standards for conversion; will participate in meeting 1981-11-19 at Ryerson Service Center with sectors 1.01, 2.05 and 2.04.*	53	NAVSEA; NAVSSE; DIPEC-TF
2.07 Power Generation 1975	3	*M*	P	Doc: Sector Conversion Plan, first draft, 1978-04. Publication of plan summary expected in *1981*; draft Units Selection Guide, 1979-10; 1980 Annual Report and Projected Plans for 1981 Sub: Planning Comment: Sectors 2.07 & 2.08 resolving conflicts in plan summaries to assure coordinated plans. Plan summary should be available in 1981; work is highlighted in Report on Metrication in the Electrical Utility Industry, Electrical World magazine, 1980-10, available from ANMC.	56	NAVFAC; Federal Power Comm; DOE; NRC; US Coast Guard; TVA; Mobility Equipment R&D Command
2.08 Electrical Goods 1975	3	*M*	P	Doc: Sector Conversion Plan, 1978-10. Publication of plan summary expected in 1981. Preferred SI Units for Use in Electrical Science & Technology, draft, 1980-01 Sub: Planning Comment: Plan summary should be available in 1981; work is highlighted in Report onMetrication in the Electrical Utility Industry, Electrical World magazine, 1980-10, available from ANMC.	42	NAVSEA; CPSC; Marine Corps
2.09 Electronic Equipment & Components 1976	2	L/M	I	Doc: 1980 Annual Report and Projected Plans for 1981 Comment: Reconvened 1980-08-10. Sector identifying tasks needed as result of Electronic Industries Assn metric study panel survey.	28	Naval Air Systems Command; FCC; Defense Communications Agency; Naval Electronic System Command; NAVAIR; NAVELEX; DESC-EM
2.10 Data Processing/ Office Equipment 1981	2	*L/M*	O	Comment: *Convening meeting 1981-10-20; sector objectives and scope statement adopted; chairman and vice-chairman established.*		
2.11 Instruments 1974	1	M	C	Doc: Metric Conversion Plan, endorsed *1981-10-21*; 1980 Annual Report and Projected Plans for 1981 Comment: *Sector approved conversion plan on 1981-09-02; plan endorsed by ANMC Steering Committee on 1981-10-21; sector approved release of plan to USMB for review.*	33	Marine Corps; NAVAIR ENG CTR; Naval Metrology Engineering Ctr
2.12 Medical Devices	2	L	I/P	Doc: Proposed Conversion Plan, 1978-05 Comment: Sector to move to Medical and Health Coordinating Group, 7.00	47	FDA; VA; Defense Personnel Supply Ctr
2.13 Water Resources 1981	3	*M*	O/I	Comment: *Independent group, Joint Committee of National Societies for Metrication in Water Resources, petitioned ANMC for full sector status, approved by ANMC Steering Committee 1981-10-21; sector is formalizing its purpose and objectives statement and developing a units guide.*	15	USGS, USDA
3.00 Construction Industries Coordinating Group (CICG) 1974	3	*M*	P/C	Doc: ANMC-CICG Report "Metric Conversion in the Construction Industries ... Planning, Coordination & Timing," 1980-08. Comment: *CICG sectors include Design, Codes & Standards, Construction Products, Contractors, Real Estate, Users/Building Owners, and Surveying & Mapping. CICG plans and schedules presented and approved at NIBS Construction Community Metric Symposium 1980-12-02/03; NIBS to determine consensus of construction industry regarding conversion.*		
4.02 Apparel 1975	1	inactive		Doc: AAMA Technical Advisory Committee report "Plan Ahead, Metrication and the U.S. Apparel Industry," 1975, available	42	Defense Personnel Support Ctr; Navy Clothing & Textile Research Unit; USA-Natick R&D Command
4.05 Textiles 1977	1	inactive		Doc: ATMI Metric Memos #1-7, Guide to Metrication for the Textile Industry, produced by ATMI, available; has prepared conversion timetable w/o dates	26	Defense Logistics Agency; USA-Natick R&D Command; Navy Clothing & Textile Research Unit
5.01 Employee Training 1974	2	L	I	Doc: SI Metric Training Guide	13	Navy; NAVFAC

committee year organized	program staff	activity level	nature	documents subsectors comments	cmte members	government participation
5.03 Educational Materials 1974	2	L	I	Doc: Metric Guide for Educational Materials	23	
5.04 Vocational ● Education 1979	2	H	I	Doc: Metric Planning Guide for Vocational Education, now available. Contact: Publications, American Vocational Assn, 2020 North 14th St, Arlington, VA 22201.	15	Navy
5.06 Engineering Education 1973	2	M	P	Doc: Expectation Dates for the Predominant Use of SI for the Teaching of Engineering Courses; 1980 Annual Report and Projected Plans for 1981 Comment: This committee also serves as Amer Soc of Engineering Education's Metrication Coordinating Committee.	19	USMB
6.00 Food & Grocery Products Coordinating Group 1974	*1*	*M*	*I*	Doc: *Statement on Inconsistent Indication of Metric Equivalents, 1981-06-03* Comment: *Group is composed of sector chairmen/convenors of nine sector committees listed below, and others interested in staying abreast of domestic and international metric events. Next meeting on 1982-05-05 to consider a position on metric package sizing.*		
6.01 Meat, Fowl & Fish	1	inactive				
6.02 Dairy Products 1977	1	L	I	Doc: 1980 Annual Report and Projected Plans for 1981 Comment: *Committee meets at least yearly or as necessary to recommend a position on metric issues under consideration by the National Conference on Weights and Measures (NCWM). Next meeting scheduled 1982-05.*	18	Defense Personnel Support Ctr
6.03 Fresh Fruit & Vegetables 1979	1	M	I	Doc: *Trade Practice Recommendations for the Fresh Fruit and Vegetable Industry, 1980, United Fresh Fruit and Vegetable Association (UFFVA).* Comment: *Committee met on 1981-09-23 as a division of UFFVA's Unitization and Productivity Committee. Current work plans include test shipments to evaluate how MUM concept (Modularization, Unitization and Metrication) is impacted by type of commodity shipped, transportation mode and container size.*	14	USDA; DPSC
6.04 Shelf Stable Food 1978	1	inactive			53	DPSC
6.05 Frozen Foods 1978	1	inactive			16	DPSC
6.06 Beverages	1	inactive		Comment: Antitrust concerns continue to inhibit organization; no short-term plans to convene sector.		
6.07 Non-Food 1977	1	L	I	Doc: 1980 Annual Report and Projected Plans for 1981		
6.08 Retailers 1978	1	L	I		11	
6.09 Food Service 1977	1	M	I	Doc: 1980 Annual Report and Projected Plans for 1981	30	USA-Natick R&D Command; DSGC
7.00 Medical & Health 1980	2	M	O	Comment: *Organizational meeting 1981-10-07. Eight new sectors formed: Pharmacy, Medicine, Laboratory Medicine, Veterinary Medicine, Nursing, Hospitals, Dentistry, Professional Journals. Medical Device sector moved from Coordinating Group 2.00 to 7.00. Task Groups include Base Units; Concentrations; Energy; Pressure; Radiation.*	17	
Ad Hoc Standards Task Group 1980	*3*	*M/H*	*I/P*	Doc: *Final Report and Recommendations, 1981-03-30.* Comment: *Task Group was organized to consider the needs of ANMC Sector Committees in the standards area and to recommend appropriate action. A survey was conducted in late 1980 of all sector committees to identify the scope and criticality of the standards issue. Ten recommendations were made to the ANMC Steering Committee on 1981-10-21.*	*17*	NBS, DoD, USMB
Ad Hoc Tariff Task Group 1980	*3*	*H*	C	Doc: *Standard Reference Tables for Metric Conversion of Transportation Tariffs, 1981-10.* Comment: *On 1981-07-16, approved publication of Std. Ref. Tables and descriptive brochure; Tables being sent for consensus review to ANMC sectors, 100 largest shippers and 25 each, largest air, motor, rail and water carriers (late 1981); press notice of availability to be sent late 1981-10; consensus format and schedule striving for adoption of Tables by mid-1982. USMB funds of $4500 received to support consensus process. Next meeting 1981-12-10.*	30	Office of U.S. Trade Rep; Defense Gen. Supply Center; DoT; NBS; ICC

Mr. **Walgren**. Thank you very much.

Mr. Rowan, if you would bear with us, perhaps we ought to just cover any ground that might properly be covered with these representatives and then we will turn to your presentation on education in the metric system.

Mr. Skeen.

Mr. **Skeen**. I have no questions.

Mr. **Walgren**. Mr. Shamansky.

Mr. **Shamansky**. No questions.

Mr. **Walgren**. I notice in your testimony that you cite the conflict between the Commerce Department report and the GAO. It is true, is it not, that the GAO is not necessarily the most clear voice in the wilderness?

As I understand it, you can get different emphases out of that agency to the same degree that you get different viewpoints among Members of Congress.

With that in mind, is the Government speaking with multiple voices that are leading in different directions?

Mr. **Kurtz**. We believe so. As we have tried to say here, we just think it would be helpful to take at least those two reports and perhaps to give a statement, if you will, of what the Government currently feels. Perhaps it is just an update, if you would, from the act and from the studies that probably helped create the act, as well as what the GAO report says.

Mr. **Walgren**. Do you have any problems with a Government agency deciding that it is best served by acquiring its products in a metric form?

Mr. **Kurtz**. I personally do not have any. I think as we have said here, we are a consensus group and almost on any issue you will find we have among our members differences of opinion. So it is very hard for me to take a firm position on that one because there are probably members who would not care for it. But inevitably, it seems to me that the Government should have a position among the agencies as to what they are doing, and in effect do have it whether it is clearly defined or not. I believe that the current Federal metric policy permits an agency to purchase products in metric when they determine that the public would be best served by that purchasing decision.

Mr. **Walgren**. Has the Metric Board's functions been supportive of your role in the private sector relating to the manufacturing lines?

Mr. **Kurtz**. There have been difficulties and there has been some positive accomplishment. Again, as I said, we are a consensus group. We have some of our members who think that the Board has done very well and we have others who do not share that same enthusiasm.

We will try to work with them if they want us to, if they continue to exist, as I think I said in my testimony.

Mr. **Walgren**. When those parts of your membership express reservations, and who do not share the enthusiasm for what the Metric Board has been doing, what kinds of things do they cite? What are their major complaints?

Mr. **Kurtz**. I think as to whether the U.S. Metric Board is a cohesive organization and whether the 17 members are in step with each other, or whether there are extreme differences of opinion on the Board.

I think those are the kinds of things we see coming out in that kind of a question.

Mr. **Walgren**. So they feel that the Board is not acting in a unified way and suffering some kind of operating paralysis?

Mr. **Kurtz**. Probably, similar to the same kind of a problem that we would have—that we do have. When you put together any kind of a group, even a voluntary one such as our own, there are those members who feel very strongly that there should be a mandate by the Government to go metric by a particular date and there is another group of people on the other extreme who say it should never happen. Perhaps the largest group is in the middle between the two, saying all right, we should work toward a date because the evidence points to the inevitability factor.

So I think when you try to bring diverse people together on a subject of this type, it is not surprising if some of us think there are problems with the Metric Board.

Mr. **Walgren**. Could you just outline for my benefit and understanding what the complexities of conversion might be? To someone from the outside it is a little hard to know all the things that do confront an industry that is dealing with this.

You indicate it does present substantial problems. What kind of issues arise? Is there a ready example that comes to mind of the complexity that the conversion presents to an industry?

Mr. **Kurtz**. Mr. Chairman, with your permission, could Mr. Meixel speak?

Mr. **Walgren**. Be happy to hear him.

Mr. **Meixel**. Our company has a number of operating divisions, about 50. We have been in existence over 100-some years. We have made a commitment to go to metric, meaning we are designing new machinery in metric. But we make machinery that lasts quite a while. We have to make parts and designs that are in inch-pound, which we will be making for many years. So it is a problem of transition; making some things in metric and other things in inches and to change all of our production over.

The engineers are for it and the production people are going to resist it. So it is a very gradual education process within our own company. Also with our customers too. It is going to take quite a while. We are headed that way, but it is going to take probably a generation to get it done.

Mr. **Walgren**. And in light of those various levels of resistance, how do you address them and what do you look to, to both the national Metric Council and whatever Government effort we might be able to make; what would you like to see those bodies do for your situation?

Mr. **Meixel**. Well, I believe it is covered fairly well in our statement.

In other words, we are moving but we need some direction as to where the Government wants to go. The GAO report, if you read the entire thing, wasn't too bad. But if you read the summary and then the paragraph headings, it gives the implication that we are not going metric.

So what is happening? Are we going metric or aren't we?

Then the Commerce study, which started in 1968 and finished in 1971, said we are on our way. So we are given double signals.

Mr. KURTZ. I think if we could add one or two examples.

The highway sign kind of thing that did cause somewhat of a disaster after it was put up there was probably the fear that the people had for metric. I think this brings us to the point where at times the Government has been very instrumental in doing the education. Perhaps that is the generation thing that Mr. Meixel has brought up here.

I do not think that all of us are comfortable with using metric in our everyday life. An example, you asked for one, a chemical company, when we did this survey I was talking to them and the concern in that company was that it had a number of plants around the country which had been built over a period of years, that there were things that had to be replaced, that those plants would exist for another 50 years.

The concern was if you change this, what is it going to do to my piping, where do I get my fittings and my valves; I only want to put them in as I repair, I do not want to replace. That was the particular concern that that chemical company had.

I think there is another aspect that when you try to look out into the future, whether we will really, as individuals, be concerned with weight and measures as perhaps we have in the past. In other words, you are going to buy a packet of flour or a bottle of coal or something like that and you won't worry whether it is a liter or a quart.

Perhaps we go through some of the computer designing and manufacturing processes, including the inspection, perhaps the system which each of us will use as individuals will become of less importance; that is a possibility. I am not sure of it, but I think that probably we won't use rulers or foot-rules or anything like that too much perhaps 50 or 100 years from now. But that is a personal opinion, that is not an ANMC position.

Mr. WALGREN. Going back to the point Mr. Meixel raises about the difficult position that industry is put in when you don't know whether we are going metric or are we not going metric? There is apparently not only a sharp difference of views that leads to a certain amount of paralysis on the Metric Board itself, but from the position of an industry out there you would—and this is a question—do you believe that the individual industry really needs to know whether or not we are headed in that direction?

And then let me ask: Are they in a better position without knowing or are they in a better position knowing whether we are or whether we are not regardless of which it is?

Mr. KURTZ. We are probably in a better position if we know where we are going but I am not sure that every industry in our association is ready for that. That is why I think we try to do it industry by industry. Those who want to go, let's see if we can help them. Those who don't, when they are ready, we stand ready to serve them.

Mr. WALGREN. All right. Anything further?

Mr. Shamansky.

Mr. SHAMANSKY. Thank you, Mr. Chairman.

I don't mind confessing to a total lack of comprehension with respect to what I call the opposition to an orderly conversion. I can understand certain industries saying we need some time and it will be a cost thing. But I have the feeling from looking over Mr. Rudd's testimony that there is—it is not just a question of money; it is a question of desecrating our history or something like that; the irrational element that I find sometimes in opposition to that.

Do you have any comment on that? Do you meet that?

Mr. **Kurtz**. I don't think I see it as a big opposition because there isn't interest in it. I don't think the average person is upset generally one way or the other as long as he or she doesn't have to do anything about it. This is why one comes back, the education system is one way, if we are going to go metric, is one way of paving the way.

But if you just throw it at people, they don't like it. I don't think metric is a burning issue except to the engineer or putting the things down on drawings. He or she has to know how to define the product or the service. And there is really a very small group on a day-to-day basis who today has to be involved in metric.

But if the general consumer doesn't know what it is about, there may be resentment raised.

Mr. **Shamansky**. With respect to educating the consumer, have our school systems actually attempted to do it? Sometimes there is no immediacy for anyone to learn if they are not going to be required to use it.

Mr. **Kurtz**. I suspect the faster that is forced in the education system, the sooner a larger share will be at metric. There are those who will take the opposite side; say, look, I studied metric in school and when I got into industry I was back to inches again, but that's a distinct base, not a general consumer basis.

Mr. **Shamansky**. Would you bring me up to date, are we not now showing highway signs with metric?

Mr. **Kurtz**. Both.

Mr. **Shamansky**. It is a dual system?

Mr. **Kurtz**. Yes.

Mr. **Shamansky**. I passed a sign yesterday in the Columbus vicinity.

Mr. **Kurtz**. There was an outcry when those systems went in.

Mr. **Shamansky**. Have we survived the outcry?

Mr. **Kurtz**. I think we moderated the program.

Mr. **Shamansky**. We did moderate the program?

Mr. **Kurtz**. It would appear that way.

Mr. **Shamansky**. Have we stopped the program?

Mr. **Kurtz**. I don't think so.

Mr. **Meixel**. I don't think it is going ahead very fast. There is one area that I think could be helped, that is, there is a fear of metric conversion by, for instance, my wife. She would never go. We put out a metric awareness booklet within companies which shows that it really isn't all that complicated. I think this could be done if we could just gradually expose the public; it is nothing to fear, you don't have to learn much.

Mr. **Shamansky**. It doesn't hurt.

Mr. **Meixel**. No, it doesn't hurt. There are only a few units which you have to know. Most of us know a liter is a little bit bigger than a quart and if it is the same price, it is a bargain.

Mr. **Shamansky**. What is a centimeter? About a third of an inch.

Mr. **Meixel**. Yes, you know the answer.

Mr. **Shamansky**. I don't know what that is.

Mr. **Meixel**. You do very well. But if there could be some public education of this to get rid of some of the fears, I think we would make some real progress.

Mr. **Shamansky**. Thank you very much.

Mr. **Walgren**. With that, I can't help put in a side comment that the oil companies are probably the wrong place to start, from a public relations standpoint. I have only gotten gasoline one time from a metric station. I must say I was very confused. That's even after I gave what I thought was a rational presentation to the National Metric Association at a morning session one time. If that is the case, it is going to be difficult for the public to make that transition.

Mr. **Shamansky**. Mr. Chairman, I changed over from asking for so many gallons to so many dollars' worth. It sort of takes care of it that way.

Mr. **Walgren**. On the subject of education, we have with us in the room a number of educators who have taken a special interest in metric education. I understand that this group has particularly been active in developing curriculum programs in conjunction with the Department of Education's metric education program. It is headed by Dr. Floyd Davis.

I would like to welcome you, Dr. Davis, and your associates to a congressional hearing. I can't imagine what you make of all this.

The next witness is Mr. Thomas Rowan, who is with the National Council of Teachers of Mathematics. Mr. Rowan is the Coordinator of Mathematics for the Montgomery County Public School System. We lead right into that subject of the role of education.

Mr. Rowan, any written statement will of course be made part of the record, but please proceed as you feel most effective.

[The biographical sketch of Dr. Rowan follows:]

Biographical Information

Name: Thomas E. Rowan

1. Position: Elementary Mathematics Coordinator
   Montgomery County Public Schools, Maryland

2. Education: B.S. (1959) Frostburg State College, MD
   M.A. (1964) University of Maryland
   Ph.D. (1972) University of Maryland

3. Professional Experience:
   1957-60 Mathematics Teacher, Montgomery County, MD
   1960-61 Research Assistant, University of Maryland
   1961-64 Mathematics Teacher, Montgomery County, MD
   1964-72 State Mathematics Supervisor, MD
   1972-81 Elementary Mathematics Coordinator, Montgomery County, MD

4. Professional Memberships:
   NCTM, National Council of Supervisors of Mathematics (NCSM), Montgomery County Mathematics Teachers Association, Maryland Council of Teachers of Mathematics, Maryland School-College Mathematics Association (MS-CMA), Maryland Association for the Educational Uses of Computers, National Society for the Study of Education Montgomery County Education Association, Maryland State Teachers Association, NEA, Phi Delta Kappa, Association for Supervision and Curriculum Development

Name: Thomas E. Rowan

5. NCTM Activities:

Research Advisory Committee (1980-83); Metric Committee (1972-77); Editor for "New Products" feature, Mathematics Teacher (1974-76); Advisory Committee for An In-Service Handbook for Mathematics Education (1977); served on program committees, presented, and presided at national, regional, and local NCTM meetings.

6. Other Professional Activities:

Member, Research Panel for School Mathematics Study Group (SMSG) 1966-68; abstractor for Investigations in Mathematics Education, The Ohio State University; field reader, Metric Education Office; Consultant, NIE; Consultant, Research Triangle Institute (North Carolina); Consultant, NSF; Contributing Editor, Journal of Children's Mathematical Behavior.

7. Publications:

Authored various articles and chapters for journals, yearbooks and other publications of NCTM and other professional organizations

8. Honors, Awards

President, NCSM, 1979-81

First Vice-President, NCSM, 1977-79

President, MS-CMA, 1972-73

Recipient, Mathematics Educator of the Year Award, Maryland Council of Teachers of Mathematics, 1980

STATEMENT OF DR. THOMAS E. ROWAN, NATIONAL COUNCIL OF TEACHERS OF MATHEMATICS, COORDINATOR OF MATHEMATICS FOR MONTGOMERY COUNTY PUBLIC SCHOOLS, BETHESDA, MARYLAND

Mr. ROWAN. Thank you, members of the committee, for permitting me to come here on behalf of the National Council of Teachers of Mathematics tc make this statement.

I am here to represent myself and the National Council in trying to communicate some of the views and concerns we have about metric education. One of the problems faced by teachers in the public schools is that of deciding what students really need to do to live successfully in the world of tomorrow.

That is always a difficult decision, but sometimes the difficulty is made more complex by those that we feel should really be helping us. The U.S. implementation of the metric system is a good example of this situation. We believe it is a disservice to the teachers and children of our schools that we have no national plan for accomplishing a gradual and systematic conversion to the metric system.

Teachers, children, and parents all feel a sense of uncertainty about where we are going and how fast. Most people now recognize that some metric instruction is essential because metric measurements are being used in many areas of commerce and industry. We do not know if we will ever be predominantly metric or, much less, how fast we might become predominantly metric.

I do think we will eventually be predominantly metric. The emphasis would be on when. But this produces a lot of uncertainty within us. We are all aware how isolated the United States is in the world of measurement. We stand alone as the only industrialized nation which does not use the metric system as its ordinary system of measurement.

This is true despite such facts as having 62 percent of all Fortune 1000 firms produce at least one metric product and having a major firm such as General Motors be currently 98 percent metric. The international isolation is not healthy for our commerce or communication in the world.

The National Council of Teachers of Mathematics believes that the needs of business, industry, and education would be much better served if this country had a clear and specific plan for fully implementing the metric system as our national system of measurement.

Despite the uncertainties of our present course, the public schools of the Nation have taken the first, and I think one of the most important steps—they are educating the youth in our schools and those youths will become the citizens of the 21st century. They are learning about the metric system.

An introduction to the metric system can be found as part of the curriculum guidelines of virtually all school districts in the United States. In the Montgomery County, Md., schools where I am employed, metric measurement is taught as the primary system of measurement in our elementary grades.

Commercially available textbooks generally include metric measurement on an equal basis with customary units or offer an option of purchasing a totally metric book. I should also insert that I am speaking of mathematics books.

Elementary students are introduced to metric units as early as the first grade and experience virtually no difficulty with them. The State of Maryland is using a totally metric standardized test as its instrument to measure the mathematics achievement of Maryland students.

Instruction in the metric system is far easier than with customary units of measure. The logical organization and decimal basis of metric measurement conforms to our base 10 system of numeration. Students find the metric units to be a natural extension of our system of counting and grouping by tens. In fact, the two actually reinforce one another for learning purposes.

The major thing which detracts from our ability to teach the metric system effectively is our national uncertainty over how far we will really go with it in our everyday lives. Will we bring it out of our national closet and make it a public system? Our schools will not be able to reach their maximum efficiency in teaching measurement until we have a plan to do this.

There is no question that it is difficult to convince the general public that it should accept a system with which it is unfamiliar and for which almost no significant public education efforts have been undertaken. An extensive public education program is long overdue and is essential to progress in metric acceptance. Such a program would certainly not be easy to plan and implement, but its benefits would far outweigh the effort required. To my knowledge, no plans are currently being drawn for such a program.

The National Council of Teachers of Mathematics and the National Council of Supervisors of Mathematics, among other professional education groups, are very concerned about present Federal programs in support of metric education and metric awareness. Federal funds which are currently being expended are producing little apparent progress toward implementation of the metric system at a public level.

I believe that the U.S. Metric Board has taken a position of virtual nonleadership, despite the sincere and concerted efforts of several of the Board members, including the education representative. This may be at least partially because of the weak nature of the charge of that board.

We urge that a widely representative task force be established that includes metric educators, the U.S. Metric Board education representative, and others concerned with designing a realistic and specific plan for implementing the metric system in the United States. The beneficiaries of such a plan would be the general citizenry, as well as the children and teachers in our schools. This recommendation has recently been communicated to the President of the United States.

The people of the United States have faced and accepted more significant changes than the metric system would present. Of course, there are always those who will say, "If God had meant man to fly, He would have given him wings." There is no way to avoid that.

The vast majority of people, though, when given an opportunity to learn the facts and the benefits, will heartily embrace this progress. The key is in planning, having a clear schedule to follow, and in educating. It is the sincere hope of the National Council of Teachers of Mathematics that the Federal agencies can and will take the leadership in a vigorous program which will enable the United States to join the rest of the world in its use of an efficient, logical, and easy-to-use system of measurement. It is our goal that the 1980's will be the decade of transition to metric measurement.

That such a reasoned approach to metric implementation can produce both progress and public support is evidenced by our experiences in the Montgomery County Schools. Seven years ago, when we decided to make our curriculum primarily metric, we had some concerns raised by parents. We formed a school-community advisory committee, developed a plan which specified the goals, the timeframe, and the limitations of our program. We offered short one-evening workshops and longer adult education courses in our schools.

A number of people took advantage of these opportunites over several years. When the interest no longer seemed to exist, we stopped the courses; but we also noted that the concerns virtually disappeared. I am not sure whether this is because of the success of our courses or because people began to believe we weren't going anywhere with metric, so they lost their interest.

In any event, last year we cooperated with the American National Metric Council in a study in one of our schools. That school had metric measurement taught to students in a way that they could then take it home and teach their parents. The program was very successful in producing increased metric knowledge and more positive attitudes in those parents.

In summary, we ask that a widely representative task force with the impetus of Federal initiation and support be established to design a realistic and specific plan for metric implementation in the United States. This plan should specify goals, a time frame, and any necessary limitations. The leader in bringing about full cooperation with such a plan should then be the appropriate Federal agencies which would implement it.

Thank you for the opportunity to speak to this issue.

Mr. WALGREN. Thank you very much, Mr. Rowan.

Could I ask if there is a copy of the position paper or particularly the transmission to the President from the National Council that you might make available to the committee by mail or otherwise for inclusion in the record?

Mr. ROWAN. We have it here.

Mr. WALGREN. We would be very interested in having that as part of the record.

[The information follows:]

N
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M

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September 15, 1981

Dr. Louis Polk
U.S. Metric Board
1600 Wilson Boulevard
Arlington, Virginia 22209

Dear Dr. Polk:

I attended the recent U.S. Metric Board meeting in Baltimore, Maryland. It was an interesting and informative experience and I appreciate the time and effort that you and the other Board members put into your Board deliberations. As a result of attending the meeting I have written an article and submitted it to the Newsletter of the National Council of Supervisors of Mathematics. I do not know if the article will be printed, but I am enclosing a copy of what I submitted.

It is my personal belief that much could be done to promote sensible public attitudes toward metrication if adequate public information were made available. This information would not have to be an attempt to "sell" the metric system, but simply a communication of accurate and clear information. We spend too much time asking people whether they are for or against things about which they are basically ignorant. Such approaches to reasoned progress are a deterant to real democratic processes. I *am not* an advocate of forcing a company, such as the Maryland Cup Corporation, to switch to metric when there is no benefit to them or anyone else. I *am* an advocate of giving people adequate information so that they can make intelligent decisions, and of providing leadership for coordination of those decisions throughout our country. We are in an era when careful planning and efficient processes are essential. The economic situation and public expectations for quality will not tolerate anything less. Whatever is happening with regard to metrication, be it voluntary or dictated by the marketplace, deserves the benefit of a supportive and knowledgeable Metric Board. That Board would not have to be pro or anti-metric, but would have to have all the appropriate information and the means to make that information available. It should have expertise in planning and coordination, and be able to respond to the needs of those who are in need of such expertise.

Obviously, I cannot say that the current Board does not serve these purposes. I can say that the discussion I observed did not give me the impression that the focus was on such things. I hope this letter, and my article, succeed in communicating the concern this impression raised in me.

Thank you.

Sincerely,

Thomas E. Rowan
Past President

TER:jg

Enclosure

Copy to:
  Mr. Smith
  Ms. Kenney

N.C.S.M. - October, 1981
Newsletter

ATTEND A U.S. METRIC BOARD MEETING!

Thomas E. Rowan

Have you ever attended a meeting of the United States Metric Board? If you haven't, I recommend it to you. The Board met in Baltimore, Maryland, on Thursday, September 10, and I decided to attend the meeting to see just what kind of input they received and how they conducted their business. It was quite interesting. There were basically three phases to the meeting. The first phase involved presentations by people who had apparently been invited by the Board. I don't know how these presentations were selected, but there was no one there to speak for education. Included among the presenters were representatives of:

Maryland Citizens Consumer Council, Inc.
National Aquarium in Baltimore
McCormick and Company
Maryland Metrics, Inc. (Metric fasteners)
The Governor's office
The John Hopkins University (The Space Telescope)

The presentations ranged from pro-metric to neutral. There was really no one among this group who was opposed to metrication. In fact, some of the presentations had relatively little to do with metrication; they seemed to be more on the order of opportunities for local public relations. Presentations on the Baltimore Aquarium and the Space Telescope seemed to fall into this PR category.

The second major phase of the meeting was a public forum. An open microphone was offered and anyone interested in addressing the Board was invited to do so. The response to this invitation brought forth the kind of variety in purpose that you would expect. Some people seemed to be using the opportunity to get some personal exposure, others were crusading, and so it went. Surprising, at least to me, was the fact that the great majority (80%) of these speakers were pro-metric. Those who were relatively anti-metric were fairly low key in their opposition.

The most interesting part of the meeting was the business meeting. I only stayed long enough to observe one motion presented, discussed and passed, but the polarization of views on the Board was obvious in that activity. The strong opponents to metrication were on the Board, rather than among the public forum speakers. It is really unfortunate that this opposition seems to be of the blind nature which sees nothing on its merits, only whether it appears to be pro or anti-metric. The issue under discussion was the possible creation of a national coordinating council for state metrication activities. This council would, interestingly, carry the acronym NCSM – for National Council on State Metrication. The purpose of the council would be to provide the opportunity for states to share information with one another so that whatever actions they take on metrication could have some chance of being coordinated logically with actions in other states. An annual meeting would be held and, I assume, communication between meetings would be facilitated.

I must admit that I am pro-metric. But even given that bias, I don't think there would be too much disagreement with my feeling that the above-described council is not terribly pro-metric. The only way I could see it being interpreted otherwise is to believe that current movement toward metrication can be reversed and that everything can be put back into customary measurement units; a rather ridiculous notion to even consider. Even if one were opposed to metrication, it would be hard not to accept the fact that some things are already metric, that these cannot be reversed, and that some kind of coordination is therefore desirable. The opponents of the creation of the coordinating council did not see things this way, even after the motion was amended to contain no financial support. That issue was to be decided separately when the Board worked on its budget.

As I said, I did not stay to hear other issues debated, although it probably would have been interesting to hear the budget debate. I now have great sympathy for those Metric Board members who are trying to move forward in a reasonable way. One does not have to be advocating immediate metric conversion to appreciate the value of coordinating what is already happening. As one of the Metric Board members asked, "What if every state had a different conversion table for liter to gallon gasoline price comparisons?" Obviously, that would not be a great help to travelers across state lines.

I would urge all members of NCSM (our NCSM) to find out when and where the U.S. Metric Board is meeting. Attend the meetings which are close to you. Get to know Metric Board members who are from your state or district. Find out whether they are helping or hindering the reasoned progress of the Board. Work on them to see the value of education and coordination, whether one is a pro or anti-metric. ■

Mr. **Walgren**. In your experince, do we lose children to mathematics that we might capture or intrigue because we are not using the metric system in education? Or is that not a factor.

Mr. **Rowan**. I would say, when we first did our changeover in curriculum in the county one of the things we did on that school-community committee was to discuss with the industry just what industries in the county's needs were, trying to formulate our curriculum. I thought they made a very intelligent response, maybe because I agreed with it so much. But they said it is fine with us to teach the metric system but it is more important for us to teach children how to measure—what measurement means—and then the unit becomes a vehicle which is secondary to the system that you are using.

I think if you are really taking that kind of an approach to teaching measurement, then what you are suggesting probably would not occur, that it wouldn't interfere wth student's development in mathematics. I think it has a stronger effect, though, on students who are slower.

You are suggesting that students might not want to go into mathematics because of interference caused by the way measurement is taught. Slower students have more difficulty with the customary system of measurement than the more able students; they are the ones who are hurt; 5,286 is not an easy number to handle, but 1,000 is.

With a system that parallels the numeration system that they are already required to learn so nicely, the metric system, educationally, just has all kinds of advantages for the students who are least able to go on in mathematics.

Mr. **Walgren**. That is an interesting point. So there are obviously more students in that area and it is in a sense even more important to bring them at least over the margin where they are going in their performance to the point where they could be satisfied with their performance in school for a whole range of attitudes.

Mr. **Rowan**. Yes; I think we open doors for those students to go on further in mathematics who might not otherwise go on.

Mr. **Walgren**. I have to excuse myself, but I will be right back.

Mr. **Shamansky**. Dr. Rowan, what other States have followed the example of Maryland in using the metric system to teach children?

Mr. **Rowan**. A number of other States have followed that example. I am not prepared to list them all. I am sure that the national council could probably provide you with information to that effect in writing later on, if you would like.

Mr. **Shamansky**. Is there any reason to think that it is sort of catching on?

Mr. **Rowan**. There was a lot of activity, a lot more activity, probably 8 or 10 years ago. I think we reached a peak and leveled off. I don't think it is receding. I think we are gradually moving ahead still, but the progress now is much slower because of this air of uncertainty of where we are really going to get with it.

With regard to the road signs, probably the educators had some role in the confusion over the road signs. Back when we first made a big impetus in the public schools to try to do some things in metric we reached out and touched a lot of people who had influence on things like the road signs. I know the Ohio State Department of Education had some role in conversing with the roads people about those signs and may have been partially at fault for pushing us ahead too fast if we did indeed move too fast on that.

[The prepared statement of Dr. Rowan follows:]

PREPARED STATEMENT OF DR. THOMAS E. ROWAN

We are all aware how isolated the United States is in the world of measurement. We stand alone as the only industrialized nation which does not use the metric system as its ordinary system of measurement. This is true despite such facts as having 62 percent of all Fortune 1000 firms produce at least one metric product and having a major firm such as General Motors be currently 98 percent metric. The international isolation is not healthy for our commerce or communication in the world. The National Council of Teachers of Mathematics believes that the needs of business, industry and education would be much better served if this country had a clear and specific plan for fully implementing the metric system as our national system of measurement.

Despite the uncertainties of our present course, the public schools of the nation have taken the first, and I think one of the most important steps—they are educating the youth in our schools and those youths will become the citizens of the twenty-first century. An introduction to the metric system can be found as part of the curriculum guidelines of virtually all school districts in the United States. (In the Montgomery County, Maryland schools, where I am employed, metric measurement is taught as the *primary* system of measurement in our elementary grades.) Commercially available textbooks generally include metric measurement on an equal basis with customary units or offer an option of purchasing a totally metric book. Elementary students are introduced to metric units as early as the first grade and experience virtually no difficulty with them. The State of Maryland is using a totally metric standardized test as its instrument to measure the mathematics achievement of Maryland students.

Instruction in the metric system is far easier than with customary units of measure. The logical organization and decimal basis of metric measurement conforms to our base ten system of numeration. Students find the metric units to be a natural extension of our system of counting and grouping by tens. In fact, the two actually reinforce one another for learning purposes. The major thing which detracts from our ability to teach the metric system effectively is our national uncertainty over how far we will really go with it in our everyday lives. Will we bring it out of our national closet and make it a public system? Our schools will not be able to reach their maximum efficiency in teaching measurement until we have a plan to do this.

There is no question that it is difficult to convince the general public that it should accept a system with which it is unfamilar and for which almost no significant public education efforts have been undertaken. An extensive public education program is long overdue and is essential to progress in metric acceptance. Such a program would certainly not be easy to plan and implement, but its benefits would far outweigh the effort required. To my knowledge no plans are currently being drawn for such a program.

The National Council of Teachers of Mathematics and the National Council of Supervisors of Mathematics, among other professional education groups, are very concerned about present federal programs in support of metric education and metric awareness. Federal funds which are currently being expended are producing little apparent progress toward implementation of the metric system at a public level. I believe that the United States Metric Board has taken a position of virtual non-leadership, despite the sincere and concerted efforts of several of the Board members, including the education representative.

We urge that a widely representative task force be established that includes metric educators, The United States Metric Board education representative, and others concerned with designing a realistic and specific plan for implementing the metric system in the United States. The beneficiaries of such a plan would be the general citizenry, as well as the children and teachers in our schools. This recommendation has recently been communicated to the President of the United States.

The people of the United States have faced and accepted more significant changes than the metric system would present. Of course, there are always those who will say, "If God had meant man to fly, He would have given him wings!" There is no way to avoid that. The vast majority of people though, when given an opportunity to learn the facts and the benefits, will heartily embrace this progress. The key is in planning, having a clear schedule to follow, and in educating. It is the sincere hope of the National Council of Teachers of Mathematics that the federal agencies can and will take the leadership in a vigorous program which will enable the United States to join the rest of the world in its use of an efficient, logical, and easy-to-use system of measurement. It is our goal that the 1980's will be the decade of transition to metric measurment.

That such a reasoned approach to metric implementation can produce both progress and public support is evidenced by our experiences in the Montgomery County Schools. Seven years ago when we decided to make our curriculum primarily metric we had some concerns raised by parents. We formed a school-community advisory committee, developed a plan which specified the goals, the time-frame, and the limitations of our program. We offered short one-evening workships and longer adult education courses in our schools. A number of people took advantage of these opportunities over several years. When the interest no longer seemed to exist, we stopped the courses; but we also noted that the concerns had also virtually disappeared. Last year the American National Metric Council did a study in one of our schools. They had metric measurement taught to students in such a way that the students could go home and teach their parents what they had learned. The program was very successful in producing increased metric knowledge and more positive attitudes in the parents.

In summary, we ask that a widely representative task force with the impetus of federal initiation and support be established to design a realistic and specific plan for metric implementation in the United States. This plan should specify goals, a time-frame, and any necessary limitations. The leader in bringing about full cooperation with such a plan should then be the appropriate federal agencies which would implement it.

Thank you for the opportunity to speak to this issue.

Mr. **Shamansky** [presiding]. I would like to thank the members of this panel on behalf of our committee for testifying. I find myself in hearty agreement with your statements and am very appreciative of your having come before us. Thank you, gentlemen.

I would like to invite the four members of the U.S. Metric Board to join us at the witness table.

Mr. **Walgren**. I would like to exercise the prerogative of the Chair to note that you don't look like you are members of a conspiracy, anyway.

Our first witness is Dr. Louis F. Polk, Chairman, U.S. Metric Board and president, Louis Polk Associates.

Welcome, Dr. Polk.

[The biographical sketch of Dr. Polk follows:]

Dr. Louis F. Polk

Dr. Louis F. Polk was appointed by the President as Chairman of the Metric Board. An authority on international metrology, he has represented the United States at various international standards meetings and served on boards and committees of national and technical scientific bodies for over three decades. An industrialist with a Doctor of Sciences degree from Miami University (Ohio) and several honorary degrees, Dr. Polk was Chairman of the National Metric Advisory Panel of the United States Department of Commerce from 1969 to 1971. He was Vice President and Director of the American National Standards Institute (ANSI), and served as Chairman of ANSI's Metric Advisory Committee.

Dr. Polk is a retired Vice President of the Bendix Corporation, having served on its Board of Directors for nineteen years, and is a past Chairman and President of the Sheffield Corporation. He is a former Director of boards in the banking, industrial, and civic fields, and continues to serve on several boards.

Dr. Polk's term on the United States Metric Board expires March 23, 1984.

STATEMENT OF DR. LOUIS F. POLK, CHAIRMAN, U.S. METRIC BOARD, AND PRESIDENT, LOUIS POLK ASSOCIATES

Dr. **Polk**. Thank you indeed, Mr. Chairman.

I have had this opportunity this morning to listen to a great deal of comment, as all of you before me have. It did remind me of a story——

Mr. SHAMANSKY. Excuse me, Doctor. Would you bring your microphone a bit closer?

Dr. POLK. Yes, is that all right?

Mr. SHAMANSKY. Much better.

Dr. POLK. Good. Now, as I listened to the many crosscurrents this morning, I was reminded of how do porcupines make love? Obviously the answer is very, very carefully, and patiently, too.

We are dealing with human nature here and I think that explains a lot as well. On behalf of the 14 current members of the U.S. Metric Board, I am pleased to be present today to discuss the accomplishments of our Board over the past 3½ years. I am pleased to have with me three of our Board members who will participate in our presentation.

They are: Ms. Sandra Kenney, an "On-Air Promotion Director" for the Maryland Center for Public Broadcasting, who is one of our at-large members on the Board; Andrew Kenopensky, who was nominated by the International Association of Machinists & Aerospace Workers and is one of our AFL-CIO representatives; and Sydney Andrews, the director, Division of Standards for the Florida Department of Agriculture, who represents the National Conference on Weights and Measures. While each Board member represents his or her constituency, I am sure all of them are aware of their responsibilities to our country as a whole as well.

We would like to provide the committee with ample time for questions. I request in addition to my remarks a longer and more substantive statement be accepted for inclusion in the hearing record.

Mr. SHAMANSKY. Since there is no one to object and I think it is a good idea, it will be included in the record.

Dr. POLK. Thank you very much.

By now most know that while the Metric Conversion Act was passed and signed into law in December of 1975—a piece of legislation that was under active consideration for almost 5 years—it was not until 1978, another 3 years later, that the Senate confirmed the 17 members of the part-time Metric Board, the first meeting being held afterwards to provide discussions concerning organization, staffing, space, equipment, and so on.

Soon after, a pro tem committee was holding meetings initiating positive action. Despite the earlier 3-year loss of momentum, the Board quickly organized itself to carry out the tasks set forth in Public Law 94-168. The timeline chart to your left, my right, shows the Board activity and accomplishment since we began operation in 1978. For your convenience, the summary chart is arranged to emphasize several features; the nature of the action and products range from intangible activities such as policy deliberations at the top of the chart to those highly tangible products such as published research findings and formal reports to the President and to the Congress at the bottom of the chart.

The three primary responsibilities of the Board are represented by the three horizontal bands noted as public awareness activity products, coordination activity products, both public and private sector, and research products. It is significant that our products, especially those tangible products that typify the output of our three primary responsibilties, have continued to increase in response to demand since our beginning.

Another item to note is the change in the ratio of our coordinating activities over a period of time. Early on, efforts in the public sector dominated. That need has been addressed and is dropping in favor of a growing proportion of response to activity in the private sector.

If this chart could extend to 1984 or 1985, it is believable that the end of our work would be signaled by a final entry that would represent the Board's policy report to the President and the Congress. That report would address whether or not the current national policy of maintaining a voluntary choice between two primary systems, or continuing use of the customary and metric measurement systems in all sectors of the U.S. economy, is appropriate and in our best interest.

The U.S. Metric Board during its first full year of operation, 1979, was funded at the $1.575 million level. In fiscal year 1980 and 1981 we were funded at a $2.547 and $2.708 million level. At the same time our Canadian neighbors have been spending approximately $7 million a year to carry out that government's policy of voluntary metric conversion and to educate and inform a population of 25 million people.

Presently the Metric Board is being funded at a $2 million level for fiscal year 1982 with 45 full-time equivalent positions, 34 permanent, 11 temporary. While that may not appear extreme, their lower funding level plus the uncertainty of whether the life of the Board has been extended beyond this fiscal year, necessitates the reduction of staff to a total of only 17 employees in two phases by April 17, 1982.

Today's complicated environment justifies unmistakable Government signals on metric policy. As the committee knows, metric is used overwhelmingly by a majority of the world. Spurred by present fiscal policies, tax reductions and liberalized depreciation schedules, many in the private sector would like to undertake the reindustrialization of America. As the Nation's industry begins this planning, critical capital investment decisions with long-term implications cannot be deferred or made in the dark without potentially serious economic consequences that will have long-term impacts on productivity and U.S. competitiveness in the complicated global marketplace. These are not easy decisions. Many industrial leaders realize they face financial, marketing and product problems, as well as concern about the increasingly uncertain direction of metric conversion in the U.S. economy.

The overall significance of measurement is involved here. After all, we are measured when we are born and when we are buried and in between, in the workplace, marketplace, counting house and home. We continually and automatically measure everything, our blood pressure, our heartbeat, our breath, our steps, automobiles, airplanes, athletic events, appliances, and so on.

There is scarcely anything that we don't measure and for good reason. It is of imperative importance even though many are unaware of measure. Respectfully, let me remind that the 21st century is less than 18 years down the highway away from us and all of us do have a duty to our descendants. They should not be hobbled or handicapped domestically or globally by outmoded or unproven experiments in measures. Our country deservedly must have the opportunity to continue as a leader in measures on a global basis.

To paraphrase an old quote, the Western nations will hang together, or we will all hang separately. We ignore measures at peril to life and treasure. This community has recently seen the tragic consequences in ignoring a great measure of ice buildup upon an airplane's wings, further compounded by a runway too short in length. No margin for error. Time does not permit dwelling upon this in detail.

It was H.L. Mencken who said, "For every complicated problem there is a solution which is neat and simple and wrong." All of us naturally prefer and strive for simple solutions. Even more, we strive for correct solutions. For all these reasons, industry may hesitate to make capital investment decisions in the absence of a clear signal of intentions from the Federal Government and some of our allies have questions, too. Before putting money on the line, our business leaders deserve a clear-cut position so they can order mills, systems and machine tools without expensive uncertainty as to the proper selection from among metric, customary, hybrid or universal stocks and standards.

As you know, article 1, section 8 of our founding Constitution gives Congress the sole and direct responsibility for weights and measures. In these complicated and tormenting times of unpredictable priorities, we do not seek a quarrel with Government. We seek and are here to help Government reach correct solutions in these complicated times, whatever the decision. We do have confidence that in your wisdom you will seek and reach a correct decision. We continue ready to help efficiently, patiently, constructively.

Mr. Chairman, we have long appreciated the support of this subcommittee and of the full committee and wish to thank you sincerely for this opportunity to outline the Board's accomplishments.

Mr. WALGREN. Thank you very much, Dr. Polk. We appreciate that.

The full statement developed from the areas of Metric Board's activity has been made part of the record.

[The attachments to Dr. Polk's statement follow:]

STATEMENT OF DR. LOUIS F. POLK, CHAIRMAN, U.S. METRIC BOARD

Mr. Chairman, on behalf of the fourteen Members of the United States Metric Board, I am pleased to be present today to discuss the accomplishments of our Board over the past 3½ years. I am pleased to have with me three of our Board Members who will participate in our presentation. They are: Ms. Sandra Kenney, an "On-Air Promotion Director" for the Maryland Center for Public Broadcasting who is one of our At-Large Members on the Board; Andrew Kenopensky, who was nominated by the International Association of Machinists and Aerospace Workers and is one of our AFL-CIO representatives; and Sydney Andrews, the Director, Division of Standards for the Florida Department of Agriculture who represents the National Conference on Weights and Measures. While each Board member represents his or her constituency, all of them are aware of their responsibilities.

Mr. Chairman, as we would like to provide the Committee with ample time for questions, I request that in addition to my brief remarks, a longer and more substantive statement be accepted for inclusion in the hearing record.

Mr Chairman, by now most know that while the Metric Conversion Act was passed into law in December of 1975, a piece of legislation that was under active consideration for almost five years, it was not until the spring of 1978 that the Senate confirmed the seventeen Members of the Part-Time Metric Board—the first meeting being held in August 1978.

Despite this three year loss of momentum, the Board quickly organized itself to carry out the tasks set forth in P.L. 94-168.

The timeline to your left shows the Board activities and accomplishments since we began operation in 1978.

For your convenience, the summary chart is arranged to emphasize several features:

The nature of the action and products range from less tangible activities such as policy deliberations at the top of the chart, to those highly tangible products such as published research findings and formal reports to the President and the Congress at the bottom of the chart.

The three primary responsibilities of the Board are represented by the three horizontal bands noted as Public Awareness, activity products, Coordination on activity products (both public and private sector) and Research products. It is significant to note that our products, especially those tangible products that typify the output of our three primary responsibilities, have continued to increase in response to demand since our beginning.

Another item that must not go unnoticed is the change in the ratio of our coordinating activitives over time. Early in our existence, efforts in the public sector dominated. That need has been addressed and is dropping in favor of a growing proportion of response to activity in the private sector.

If the chart could extend to 1984 or 1985, I believe the end of our work would be signaled by a final entry that would represent the Board's policy report to the President and the Congress. That report would address whether or not the current National policy of maintaining a choice between and continuing use of the customary and metric measurement systems in all sectors of the U.S. economy is appropriate and in our best interest.

The U.S. Metric Board during its first full year of operation (FY 1979) was funded at a $1.575 million level. In FY 1980 and FY 1981 we were funded at a $2.547 and $2.708 million dollar level respectively. At the same time our Canadian neighbors have in recent years been spending approximately $7 million dollars per year to carry out that government's policy of voluntary metric conversion and to educate and inform a population of 25 million people.

Presently, the Metric Board is being funded at a $2 million dollar level for FY 1982 with 45 full time equivalent positions (34 permanent, 11 temporary). While that may not appear extreme, this lower funding level plus the uncertainty of whether the life of the Board will be extended beyond this fiscal year, necessitates the reduction of staff to a total of only 17 employees in two phases by April 17, 1982.

Today's economic environment demands unequivocal government signals on metric policy. Spurred by this Administration fiscal policies, tax reductions, and liberalized depreciation schedules, the private sector stands poised to undertake the reindustrialization of America. As the Nation's industry begins this planning, critical capital investment decisions with long term implications cannot be deferred or made in the dark without potentially serious economic consequences that will have long term impacts on productivity and U.S. competitiveness in the global marketplace. Many industry leaders have expressed concern about the increasingly uncertain direction of metric conversion in the U.S. economy. For this reason, industry may hesitate to make major capital investment decisions in the absence of a clear signal of intentions from the Federal government. Before putting money on the line, business leaders want and deserve a clear-cut position so they can order mills, systems, and machine tools without expensive uncertainly as to the proper selection from among metric, customary, hybrid, or universal stocks and standards.

Mr. Chairman, we have long enjoyed the support of this Subcommittee and of the full committee, and wish to thank you again for this opportunity to outline our acomplishments.

[The prepared statement of Dr. Polk follows:]

STATEMENT OF DR. LOUIS F. POLK
CHAIRMAN, UNITED STATES METRIC BOARD

Mr. Chairman, on behalf of the fourteen Members of the United States Metric Board, I am pleased to be present today to discuss the accomplishments of our Board over the past 3½ years. I am pleased to have with me three of our Board Members who will participate in our presentation. They are: Ms. Sandra Kenney, an "On-Air Promotion Director" for the Maryland Center for Public Broadcasting who is one of our At-Large Members on the Board; Andrew Kenopensky, who was nominated by the International Association of Machinists and Aerospace Workers and is one of our AFL-CIO representatives; and Sydney Andrews, the Director, Division of Standards for the Florida Department of Agriculture who represents the National Conference on Weights and Measures. While each Board member represents his or her constituency, all of them are aware of their responsibilities as statesmen.

Mr. Chairman, as we would like to provide the Committee with ample time for questions, I request that in addition to my brief remarks, a longer and more substantive statement be accepted for inclusion in the hearing record.

Mr. Chairman, by now most know that while the Metric Conversion Act was passed and signed into law in December of 1975, a piece of legislation that was under active consideration for almost five years, it was not until the spring of 1978 that the Senate confirmed the seventeen Members of the Metric Board -- the first meeting being held in August 1978.

Despite this three year loss of momentum, the Board quickly organized itself to carry out the tasks set forth in P.L. 94-168. The timeline to your left shows the Board activities and accomplishments since we began operation in 1978.

For your convenience, the summary chart (attached) is arranged to emphasize several features:

-- The nature of the action and products range from less tangible activities such as policy deliberations at the top of the chart, to those highly tangible products such as published research findings and formal reports to the President and the Congress at the bottom of the chart.

-- The three primary responsibilities of the Board are represented by the three horizontal bands noted as Public Awareness activity products, Coordination activity products (both public and private sector) and Research products. It is significant to note that our products, especially those tangible products that typify the output of our three primary responsibilities, have continued to increase in response to demand since our beginning.

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COORDINATION

In the area of Coordination, the Metric Board has focused on three specific areas: the private sector, the federal government, and the states.

When the Board became operational in FY 1978, it was faced with the challenge of establishing an effective consultation mechanism for all sectors of our economy taking into account activities underway and avoiding unnecessary duplication of such activities (Section 6(1) of the Act). Section 6(2) charged the Board with providing appropriate procedures to facilitate formulation and coordination of specific programs for the metric conversion of each industry sector.

What we found at that time was industry conversion planning already well underway under the auspices of the American National Metric Council (ANMC), Federal agency coordination beginning, and some metric councils being formed at the state government level. However, there was no mechanism for coordination among the states, or between states, the Federal agencies and private sector metric planning organizations such as ANMC.

As a first order of business we established the following programs to provide an effective consultation mechansim:

-- Federal Program - a policy level interagency metric committee, the Interagency Committee on Metric Policy (ICMP) which assumed responsibility for an existing network of Federal agency metric experts and coordinators.

-- State Program - a committee of represetnatives of the 50 State Governors, the National Council on State Metrication.

-- Private Sector Program - A cooperative agreement formally recognizing the lead role of the American National Metric

Council in developing industry conversion plans.

-- Standards Program - Initiated consultation with existing Federal, State and private sector standards organizations and the ANMC Ad Hoc Committee on Standards.

-- Conversion Data Program - Organization, classification and storage of metric information.

I said earlier that our initial Coordination efforts were both organizational and procedural. Our procedural work was concentrated in two areas: development of USMB Planning Guidelines and development of consensus Federal agency metric conversion policy and accompanying guidelines.

USMB PLANNING GUIDELINES

To assist the private sector in conversion planning, a detailed set of planning guidelines were developed, approved and published in the Federal Register. The procedures stressed the principle of openess as well as fair and ample opportunity for participation by all affected parties. Plans submitted to the Board for review would have to demonstrate they had met these minimum requirements to be considered for endorsement by the Board.

USMB Planning Guidelines were the product of over 16 months of effort involving extensive coordination with all potentially affected industries, organizations and individuals. The result was a set of systematic steps for use in preparing metric conversion plans. The guidelines also outlined the various types of assistance that the Board could provide to private sector groups contemplating or in the process of developing conversion plans. The offer to provide meaningful assistance to voluntary planning groups was felt to be a low-cost and effective means of encouraging the use and adherance to the Board's planning guidelines while promoting greater consistency and minimum acceptable standards for conversion planning efforts.

The efficacy of the Board's providing guidance as well as assistance in the major planning efforts underway was demonstrated in the recent completion and endorsement by the Board of two industry-wide conversion plans. The ANMC Instruments Sector Conversion Plan and the ANMC Chemicals and Allied Products Sector Conversion Plan were both developed using procedures which were designed to be compatible with the Board's guidelines. Both plans reflected conscious efforts to meet the established criteria in the guidelines, particularly the requirement for widespread involvement and public awareness of the planning efforts.

The Chemicals and Instruments Plans were submitted by ANMC to the U.S. Metric Board for review and endorsement in October, 1981. Following an extensive review process which tested each plan's sufficiency and compatibility with the guidelines, they were endorsed by the Board. Board endorsement means that the plans met the criteria established by the Board.

While the Planning Guidelines were under development, the Board was involved in coordination of actual metric conversion as well as planning for metric conversion. I will provide an example of each.

Early in the Board's existance a problem began to develop in the dispensing of gasoline. As the price of gasoline approached $1.00 per gallon most of the Nation's gasoline pumps were incapable of computing sales over $1.00 per gallon. In the short-term, the pumps were adjusted to sell by "half pricing." Long-term solutions were purchasing a metric gear box and selling by the liter or purchasing a new computer capable of handling the over $1.00 per gallon price.

The Board became concerned that this situation had the potential for considerable confusion among retail dealers, their customers and the State weights and measures officials who regulate retail gasoline sales. The Board, therefore, held hearings, published a report, and encouraged and assisted interested parties in development of coordinated plans for dealing with the problem.

An example of Board involvement in the conversion planning process is our work with the construction industry. Although this industry had developed a conversion plan under the auspices of the American National Metric Council, the plan lacked consensus among the many diverse parties of this complex industry.

In December, 1980, a Construction Industry Metric Symposium was sponsored by USMB, ANMC and the National Institute of Building Sciences (NIBS). For over a year, Board staff participated in bringing together the principal organizations to host the symposium. The purpose of the symposium was to gather decision-makers from all segments of the construction industry to determine if it was in the best interest of the industry and the Nation to begin a planned conversion to metric measurement.

The outcome of the effort was an unprecedented gathering of leaders from throughout the industry and the most in-depth analysis of the various aspects of metric conversion which had taken place in any industry sector considering conversion to the metric system.

Let me now turn to our Federal Program.

FEDERAL PROGRAM

Even though USMB initiatives in the Federal area have been numerous, it is important to point out that there was Federal metrication activity before the Metric Conversion Act of 1975 became law. The National Bureau of Standards (NBS) in the Department of Commerce has long been actively involved with the metric system because it is responsible for the Nation's physical measurement system. NBS undertook in the period 1968-1971 the U.S. Metric Study at the request of the Secretary of Commerce under Public Law 90-472. After completion of the Study, NBS maintained a small Metric Information Office.

The Education Amendments of 1974 (P.L. 93-380) established a Metric Information Office within the U.S. Office of Education to provide grants of funds to nonprofit organizations for metric education projects.

Within the area of internal agency metrication efforts, agencies generally had been following industry's lead. But, because of critical program needs, several agencies such as the Department of Defense and the Department of Agriculture had to proceed with metrication on their own. Subsequently, there were cases where metrication in some agencies was initiated with insufficient preparatory coordination. In response, the Interagency Committee on Standards Policy (ICSP), which is chartered by Department of Commerce, established a Metrication Subcommittee in June 1975.

In 1978, at the inception of the USMB, there was agreement between the Office of Management and Budget and the Department of Commerce that the Department-proposed high-level policy committee, the Interagency Committee on Metric Policy (ICMP), be established under the auspices of the U.S. Metric Board. The Board's primary objective for the ICMP was to develop, by consensus, effective and consistent metric conversion policies for voluntary metric conversion activities among Federal agencies. In October 1978, the ICMP had its organizational meeting at which it adopted a charter and agreed to sponsor the ICMP Metrication Subcommittee, renaming it the Metrication Operating Committee (MOC). The MOC was to support the ICMP's policy-level coordination of interagency metrication activities. Individual MOC members were "metric coordinators" within their agency. The ICMP/MOC was set up to be the focal point of the Board's federal metrication policy and program coordination. As one of its initial tasks the MOC set about the development of a concensus federal metrication policy and associated implementing guidelines.

As a result of these efforts and after approval by the ICMP and the U.S. Metric Board, the Metric Conversion Policy for Federal Agencies and the supporting Federal Agency Guidelines for Implementation of Metric Conversion Policy were published in the Federal Register on April 30, 1981. The policy states that Federal agencies shall conduct their metrication activities in a coordinated manner consistent with the Metric Conversion Act and compatible with metric conversion trends in the Nation. Agencies have two roles to play in metrication: (1) when the agency needs to take a metrication initiative, it shall do so in the public interest and with consideration of the private sector and state and local governments; and (2) take appropriate internal agency actions to adapt to metrication initiatives from the private sector.

To enhance coordination among the Federal agencies, the MOC established subcommittees to identify and assist in the resolution of interagency metrication issues. The Metric Practices and Preferred Units Subcommittee developed Federal Standard 376, Preferred Metric Units for General Use By the Federal Government, July 8, 1980; approved a draft of Federal Standard 377, Metric Practice for Federal Agencies; and developed, Guidelines for

Converting Measurement Units in Agency Press Releases to Metric Units, which was attached to the Resolution on the Use of Metric Units in Agency Press Releases, approved by the ICMP on February 4, 1981. These documents have resulted in more consistent metric practices throughout the Federal government.

The MOC has also encouraged Federal agencies to assign agency personnel to serve on private sector metric conversion planning committees by adopting Model Guidelines for Federal Employee Participation on Private Sector Metric Conversion Planning Committees.

STATE PROGRAMS

When the Metric Board began operation in 1978, it was quickly perceived that the states had a paramount interest in metrication planning and coordination. The reasons for this interest were many: the possibility for frustration of interstate commerce if metrication was not coordinated among the states; the states' traditional roles in the areas of commercial measurement and education and, more recently, consumer protection; and, the opportunity for metrication learning experiences arising from the activities of 50 separate states to be properly coordinated at the national level.

To address this interest the Board established a committee of representatives of the 50 State Governors. The State Program evolved from a series of regional planning meetings which led to formation of the National Council on State Metrication (NCSM) with representatives formally appointed to the council by each state's Governor.

The U.S. Metric Board's State Program is comprised of four major project areas: the National Council on State Metrication annual meeting; creation of a State Metric Clearinghouse; encouraging states to officially establish metric councils; and, continued support of existing state metric councils.

The 1981 National Council on State Metrication meeting was held June 23-25 in Des Moines, Iowa. The three-day meeting was highlighted by a session devoted to private sector metrication in the Midwest. The State representatives also approved forwarding to the Board of a charter defining the role of the Council as a Federal Advisory Committee. The Board subsequently, at its September meeting in Baltimore, approved forwarding of the charter to the General Services Administration for approval. The charter now awaits action by the Office of Management and Budget.

A contract was awarded in FY 1981 to design the State Metric Clearinghouse. The system envisions incorporation of data contained in the already-published (1980) State Metric Status reports, a seven-volume report on metrication progress in the 50 states, and issuance of regular newsletters on the state metric activity.

In a related matter, complimenting our State Program, our Office of General Counsel has made available to the Attorneys General and Legislative Councils of the several states, a Metric Legal Information Kit that includes information on the American Bar Association approved model law entitled "The Uniform Metric System Procedures Act (UMSPA).

STANDARDS PROGRAM

Let me now describe the Board's standards program which is derived from Sections 6(4),(5) and (6) of the Act. These sections call for encouraging the development of metric standards and also encouraging industry and standards writers to maintain and enhance the current acceptability of superior U.S. technology and products in customary units.

The Board has conducted a survey of the 432 U.S. Standards developing bodies, and is in the process of surveying standards and specifications developing groups within the Federal government to develop a stragegy to adequately meet the requirements of the Act. Our prepiminary findings are:

-- Metrication is neither a major issue nor problem and is not a priority matter for standards developing organizations.

-- Standards development organizations react to the marketplace. There is at present no articulated pressing demand for metric standards.

-- Standards developing organizations acknowledge the need for raising metric awareness among both the standards users and standards writing organizations.

-- Although standards in many cases follows technology, it is feasible to develop metric standards to support planned product conversion.

-- Wide variety of industry economic factors and technology preclude a single strategy for metric standards.

-- Several barriers to the development and use of metric standards have been cited by standards developers.

-- Standards developers generally felt that they have the infrastructure in place to respond to a significant increase in the development of metric standards.

-- Some organizations are concerned about the threat of foreign origin standards displacing U.S. non-metric standards.

-- About one-quarter of the standards bodies have formal policies on metrication.

-- About 10 percent of the standards bodies use metric only in their technical publications and standards, almost half use inch-pound units only, and almost half use dual units.

-- About one half of the standards bodies states that the constituencies which they serve are either now metric or will be converted within 10 years.

RESEARCH

In the period from the establishment of the United States Metric Board to the present - or about 3 years - the Board has initiated

17 research studies. Most have been contracts with small business or minority-owned research firms; some have been carried out by the Board's staff. At this time, seven projects are still active, principally in the final analysis and report writing stages, and the program will result in 24 reports. With your permission we would like to have our completed work to-date made part of the record.

The point of departure for the research program plan was the Metric Conversion Act of 1975. Congress suggested a series of topics and issues that should be addressed by the research of the Board. I am pleased to report that our comprehensive, if inexpensive, research program dealt with practically all of the suggested topics.

In this area of research and research-related reports, the United States Metric Board has completed the following initiatives:

-- A survey of large U.S. manufacturing and mining firms the (Fortune 1000) to determine metric status reported, among other things, that while 6 percent of the sales by the Nation's top industrial firms are from products that are made to metric dimensions, there was little evidence of comprehensive corporate level metric planning and coordination. An additional 5 percent of sales income involves products labeled in metric units. Sixty-three percent of the largest industrial firms sell products that are either made to metric dimensions or carry metric information on the labels. About half of all large companies sell "soft-converted" (dual labeled) items, while about one-third of the companies have "hard-converted" (metric dimensioned) some of their products to metric standards.

-- A survey of small businesses to identify the issues in metric planning and conversion to the metric system reported, among other things, that for the selected business categories surveyed, problems encountered in the process of metricating have generally been met and overcome by the use of resources within the business community and apparently without serious economic or operational trauma.

A study of the costs and benefits of conversion to small business, which focused on converted companies reported, among other things, that it was difficult to find any converted small business that had endured significant costs as a result of conversion. Additionally, it reported that investments in metric are routine, insubstantial and difficult to isolate from other business costs.

-- A study of the effects of metric conversion on measurement sensitive occupations reported, among other things, that upon review of occupational job descriptions listed in the U.S. Department of Labor's Dictionary of Occupational Titles, it was found that 46 percent of occupations are sensitive to measurement change.

A subsequent survey of measurement sensitive occupations reported that workers in certain specific industries that must buy their own tools bear an unnecessary burden in that they are unaware or unable to avail themselves of tax deductions relative to the purchase of metric tools.

-- The Board conducted a study of metric conversion of distilled spirits containers as well as a survey of consumer attitudes toward and awareness of that conversion. This effort focused on the Board's Planning Guidelines and what effect they might have had on this conversion had they been in place in the early 1970's. The report stated, among other things, that the Board's procedures are useful and might have improved the distilled spirits conversion especially in the area of consumer input.

The survey portion reported that consumers are generally aware of the fact that distilled spirits containers are in metric sizes but specific knowledge is not widespread. This lack of knowledge, however, does not appear to affect consumers.

-- As required by Public Law 94-168, the Metric Board completed a year-long study of legal impediments and barriers and producted a report "Providing a Metric Option." The report concludes that, while future changing conditions may require otherwise, there is no present need for Congress to provide a new structural mechanism to convert customary units of measure to metric units in laws and regulations at all levels of government.

-- The Board has published a booklet titled "Antitrust: A Handbook for Metric Planning and Conversion," to be of assistance to the nonlawyer which we believe will substantially minimize the antitrust risks for companies that engage in joint efforts to develop and implement metric conversion plans.

-- A further study on the impact of laws on metric conversion reported that a survey of large firms confirmed those companies' perceptions that there are no major legal barriers to metrication. This report stated, however, that firms planning to convert do have to take into account certain laws (for example, antitrust laws on the National level and building codes on the local level) as part of the planning process.

As a result of the emphasis the Congress placed on them, the areas particularly targeted by the research program were: statutory barriers to metrication, the affects of metrication on occupations and workers, and the effects on small business. The following summarizes the Board's findings on these topics, indicates the accomplishments of the program, and discusses more generally the implications of the research and the effect cutting off our activities will have on the Nation's knowledge base.

With respect to legal and regulatory barriers to metrication, we have found (as reported to Congress earlier) that, while legal impediments and annoyances prevail throughout the various jurisdictions of the country, there are few legal barriers to metrication. Further, there is no current requirement for any new structural mechanism for converting customary units to metric units in statutes, regulations, and other laws. In addition, business firms (particularly the largest manufacturing firms and the leaders in private sector initiated conversion) do not see laws and regulations as real impediments to metrication, but do consider certain laws when planning conversion. Antitrust issues and building codes are the two areas of greatest concern. Fair packaging and labeling, and weights and measures laws are of lesser concern.

With regard to small business, problems encountered in the process of converting to the use of the metric system have been met and solved generally with resources from within the business community and with little economic or operational trauma. This finding dispels previous concerns in this regard. Metric conversion occurs in the context of many other business decisions on equipment, customer needs, worker relations, finances, and relations with suppliers and other companies. Metric conversion, while often an important consideration, is rarely a primary concern in manufacturing decisions.

The capability of small manufacturers to produce to metric dimensions is widespread but shallow. This could not be validated until now.

Investments in metric production are routine, insubstantial and difficult to isolate from other business costs. The costs of conversion diminish in comparison to small businesses' concerns with inflation, energy and material costs, interest rates, and general economic conditions. Small businesses see their metric production as neither voluntary nor forced, not a search for new business markets or other benefits, not dictated by any one company, but rather a result of general industry trends.

Small manufacturers are flexible; they use a rich array of management and manufacturing practices to produce metric products. This, also, could not be validated until now.

With respect to occupations and workers, we have found that, while many occupations are measurement sensitive, and hence may be affected by metrication, an equal number are not measurement sensitive. Workers in certain industries, where it is the norm that the worker own tools (for instance, automotive maintenance and repair), have borne and will continue to bear a burden when they are required by their employers to convert to metrics. Many such workers are unaware of, or are unable to avail themselves of, legal income tax deductions for the cost of metric tools required for their jobs. We have called this finding to the attention of the Congress and the President, as required by the Act.

Training for use of metric measurements on the job is usually provided and paid for by employers (generally, metric tools are also purchased by the employers, as well). Some workers experience anxiety when faced with conversion in the workplace; older workers are especially prone to such concerns. After training, however, anxiety decreases and disappears. Overall, we feel we have a good understanding of the costs of conversion -- both in terms of money and the intangibles (such as anxiety, fear, dislocation, and the like).

Unfortunately we cannot testify that all necessary research is complete. There is a large area of unknown that we are concerned about: the costs of not converting, the opportunity costs of not working in the metric system, the National benefits of conversion, and the more subtle costs of maintaining multiple systems of measurement. We are just beginning to explore some of these issues through studies of econometrics, the national system of accounts, and international trade.

A fair generalization summing up our findings would be to say that the earlier perceived problems of conversion to the metric system have largely evaporated when studied. Legal barriers appear to be nominal. Disruption and inconvenience to both small and large business appear inconsequential. Where occupational costs or inconveniences were found, our research has shown creditable estimates of the scope, amount and location of the costs so that they may be addressed and minimized before the fact.

Our earlier work has shown that the perceived barriers to metrication are far less than originally contemplated. We would prefer to report to you, but cannot, on the extent and effect of the costs to the United States of continuing to support two primary measurement systems and the appropriate sectors of the economy that may benefit from thoughtful consideration of abandoning one or the other of the current systems. We believe the answer would have shown the relevant costs of dual measurement systems and the relevant benefits of a single measurement system to be far more than originally contemplated.

PUBLIC AWARENESS AND EDUCATION

Section 6(7) of the Metric Conversion Act directs our Board to "assist the public through information and education programs, to become familiar with the meaning and applicability of metric terms and measures in their daily life.

To be candid, it is extremely difficult to educate and inform the American public on any issue with very limited resources. With the funds we have received, we are pleased to point to the following accomplishments:

-- The U.S. Metric Board has held bimonthly Public Forums (map attached) to receive comments from the private sector and citizens relating to on-going conversion or the issue in general.

-- We have printed and distributed to the public, educational materials explaining not only the National policy on metric, but how to use the metric system as well. With your permission, we would like to make these materials part of the record at this time.

-- To date our public awareness program has secured well over 200 TV and radio interviews and has reached a potential audience of 150 million people through all media.

-- In 1980 and 1981 the Metric Board planned and coordinated National Metric Week which reached, through schools, museums, industry and public information posters, an estimated potential audience of 45 million. This program was selected for study as one of the year's outstanding public relations efforts.

-- We have raised public awareness by participating in special events such as the March of Dimes Walk-a-Thon and Special Olympics.

-- We have developed and distributed public service announcements for Winter Olympic Games (radio used by ABC network) and Liter Dispensing of Gasoline (radio and TV carried by networks), free of charge.

-- We have developed and distributed a weekly public service radio series entitled "Metric Magazine" which has been placed in all major media markets and with over 500 radio stations, free of charge.

-- We published a document entitled "Metric Usage Study: A Look at Six Case Histories" detailing both problems and opportunities in metric conversion.

-- We have organized and conducted metric training seminars for private industry, government employees, and Congressional a aides.

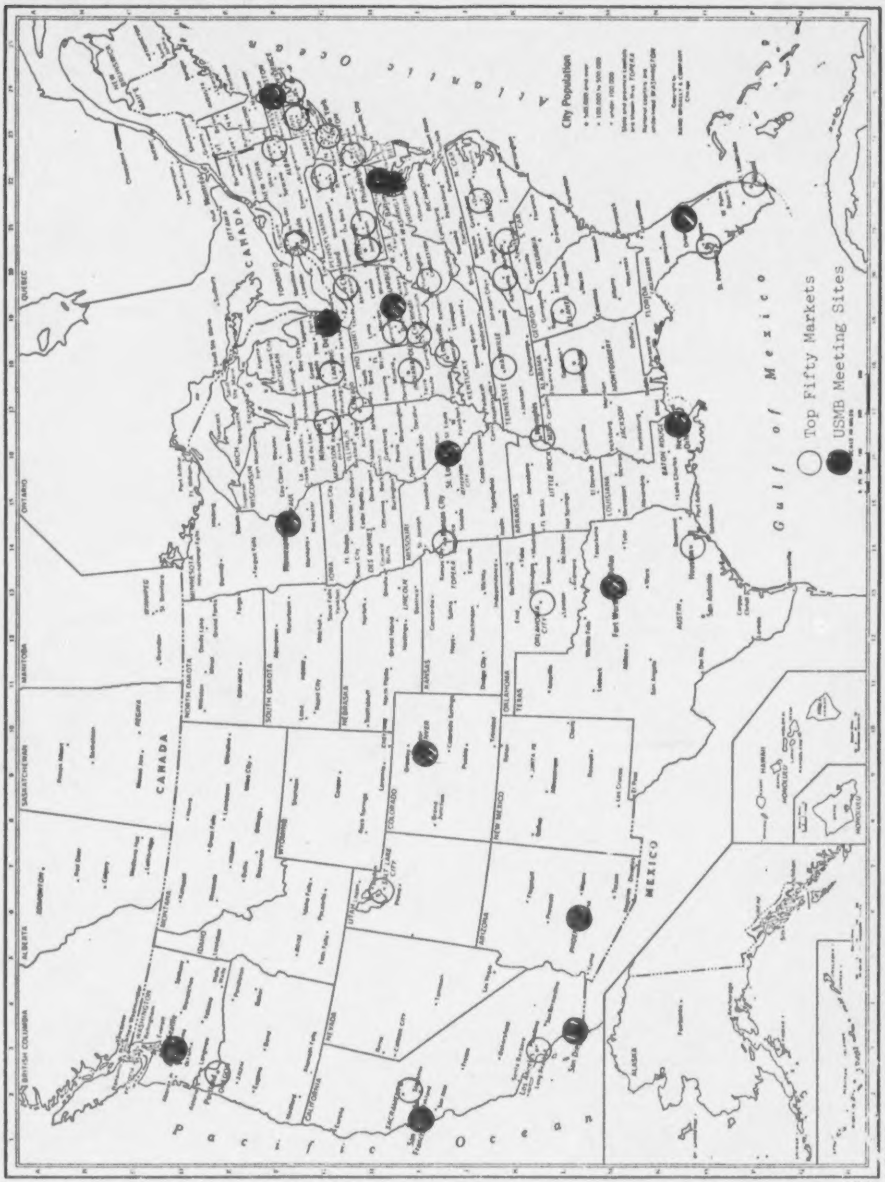
-- We have produced and distributed eleven television public service announcements to 200 stations and are gratified to report that they are enjoying "prime time" coverage, free of charge.

Mr. Chairman, thank you for the opportunity to provide this committee with the accomplishments of the United States Metric Board. I would be happy to answer any of your questions.

ITEM		1975	1976-77	1978	1979	1980	1981	1982 (PARTIAL)
ORGANIC ACTIONS		• PASSAGE OF ACT		• BOARD APPOINTMENTS				
BUSINESS				• ORGANIZATIONAL MEETINGS (3)	• BOARD MEETINGS - BRIEFINGS & POLICY DELIBERATIONS (7)	• BOARD MEETINGS - BRIEFINGS & POLICY DELIBERATIONS (8)	• BOARD MEETINGS - BRIEFINGS & POLICY DELIBERATIONS (8)	• BOARD MEETINGS - BRIEFINGS & POLICY DELIBERATIONS (4)
PUBLIC INVOLVEMENT					• REGIONAL FORUMS - HEARINGS ON LOCAL PUBLIC & BUSINESS VIEWS (3)	• REGIONAL FORUMS - HEARINGS ON LOCAL PUBLIC & BUSINESS VIEWS (5)	• REGIONAL FORUMS - HEARINGS ON LOCAL PUBLIC & BUSINESS VIEWS (6)	• REGIONAL FORUMS - HEARINGS ON LOCAL PUBLIC & BUSINESS VIEWS (1)
PUBLIC AWARENESS ACTIVITY PRODUCTS						• 4½ MIN "METRIC MAGAZINE" RADIO SPOTS • "CONSUMER FORUM" (2) • METRIC WEEK • 30, 60 SECOND TV SERVICE SPOTS SERIES	• CONSUMER EDUCATION MAT'LS KIT - RETAIL GAS PUMP CONVERSION • "CONSTITUENCY" CONSULTATION RECEPTION • 30 & 60 SECOND TV PUBLIC SERVICE SPOT SERIES • METRIC WEEK	• LEADERS GUIDE FOR METRIC USAGE SEMINARS • "CONSTITUENCY" CONSULTATION RECEPTION
COORDINATION ACTIVITY PRODUCTS	PUBLIC SECTOR					• ANTI-TRUST HANDBOOK FOR METRIC PLANNERS • FIRST NATIONAL COUNCIL MEETING ON STATE METRICATION • STATE METRIC STATUS REPORTS • LEGAL INFORMATION KIT FOR STATE ATTORNEYS-GENERAL	• SECOND NATIONAL COUNCIL MEETING ON STATE METRICATION • DELIBERATIONS LEADING TO STATE COUNCIL "CHARTER" • FEDERAL METRIC STATUS REPORT • FEDERAL METRIC POLICY & GUIDELINES	• FEDERAL METRIC INFORMATION REFERRAL DIRECTORY
	PRIVATE SECTOR				• HEARINGS ON GAS PUMP CONVERSION • HEARING REPORT & ANALYSIS OF RETAIL FUEL PUMP CONVERSION	• PRIVATE SECTOR PLANNING GUIDELINES • CO-SPONSOR - CONSTRUCTION INDUSTRY METRIC CONFERENCE	• HEARING ON CHEMICAL SECTOR CONVERSION PLAN • HEARING ON INSTRUMENT SECTOR CONVERSION PLAN • ANALYSIS & REPORT ON CONSUMER INTERESTS • CO-SPONSOR, TARIFF CONVERSION REFERENCE TABLES	• ANALYSIS OF CHEMICAL SECTOR CONVERSION PLAN • ANALYSIS OF INSTRUMENT SECTOR CONVERSION PLAN • USMB APPROVAL - CHEMICAL SECTOR PLAN • USMB APPROVAL - INSTRUMENT SECTOR PLAN • INDUSTRY PANEL CONSULTATION (MEDICAL SERVICE)
RESEARCH PRODUCTS					• LEGAL STUDY OF METRIC MEASUREMENT & LEGISLATION BARRIER • [illegible] REPORT ON LEGAL [illegible] TO [illegible] CONVERSION	• U.S. DoC CONVERSION INFORMATION COMPILATION • SURVEY OF SELECTED LARGE U.S. FIRMS & INDUSTRIES • METRIC USAGE - 6 CASE HISTORIES • METRIC STATUS - 5 YEARS AFTER THE ACT • SURVEY OF METRIC PLANNING ISSUES FOR SMALL BUSINESS	• RESEARCH TECHNIQUES TO ASSESS NATIONAL METRIC STATUS • SURVEY OF SMALL BUSINESS WITH INVESTMENTS IN METRIC • METRIC IMPACTS ON WORKER-OWNED TOOLS & WORKER TRAINING • CHRONOLOGY OF THE DISTILLED SPIRITS UNPLANNED CONVERSION • USMB REPORT ON METRIC ISSUES AFFECTING SMALL BUSINESS • POLICY ANALYSIS OF USMB PLANNING GUIDELINES	• SURVEY OF CONSUMER AWARENESS OF A MAJOR CONVERSION • CASE STUDIES - INTERACTION BETWEEN LARGE & SMALL BUSINESS • LEGAL IMPEDIMENTS TO METRICATION - A FOLLOW-UP STUDY • POTENTIAL COSTS AND BENEFITS OF METRICATION FOR SMALL BUSINESS • EFFECTS OF METRICATION ON PRODUCTIVITY AND SAFETY • SURVEY OF SUPERMARKET LABELING IN METRIC • POTENTIAL EFFECTS OF FEDERAL PROCUREMENT IN METRIC • AGGREGATION OF RESEARCH FINDINGS - AN OVERVIEW
REPORTING INITIATIVES					• REPORT TO PRESIDENT & CONGRESS ON LEGAL BARRIERS TO CONVERSION	• GENERAL REPORT TO PRESIDENT & CONGRESS	• REPORT TO PRESIDENT & CONGRESS ON METRIC IMPACT OF WORKER TOOLS • GENERAL REPORT TO PRESIDENT & CONGRESS	• GENERAL REPORT TO PRESIDENT & CONGRESS

RAND McNALLY
STATE CITY MAP

UNITED STATES
SIZE 8½ x 11


Atlantic Ocean
Gulf of Mexico
Pacific Ocean
CANADA
MEXICO
City Population
○ Top Fifty Markets
● USMB Meeting Sites
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Mr. **Shamansky**. Has anybody ever compared your voice to Victor Borge's?

Dr. **Polk**. No. That comes under the heading of a first, if I can measure that.

Mr. **Shamansky**. There is a certain very pleasing ring to it, I want you to know.

Dr. **Polk**. Thank you very much.

Mr. **Andrews**. He doesn't play the piano, either.

Dr. **Polk**. I played the violin, as a matter of fact.

Mr. **Shamansky**. Let me ask you, then, to introduce your colleagues.

Dr. **Polk**. Next on our program I introduce Sydney Andrews, who I previously mentioned. He is prepared now to give his presentation.

[The biographical sketch of Mr. Andrews follows:]

SYDNEY D. ANDREWS

Mr. Sydney Andrews is the standards Member on the Metric Board, representing the National Conference on Weights and Measures and other standards-making organizations. He is past Chairman of the Florida Metric Council and has been with the Florida Department of Agriculture and Consumer Services since 1933, serving as Director of its Division of Standards since 1968. Mr. Andrews is past Chairman of the National Conference on Weights and Measures (NCWM) and a former Chairman of NCWM's Standing Committee on National Measurement Policy and Coordination.

STATEMENT OF SYDNEY D. ANDREWS, MEMBER, U.S. METRIC BOARD AND DIRECTOR, DIVISION OF STANDARDS, FLORIDA DEPARTMENT OF AGRICULTURE

Mr. **Andrews**. Thank you, Dr. Polk.

Mr. Chairman, it is a pleasure to be back with you again. This time on a different mission, but equally as dear to my heart as my last appearance with you. As a member of the U.S. Metric Board, I represent the National Conference on Weights and Measures and Standards Making Organizations.

I would like to talk with you a little about our area of planning and coordination. The Metric Board has focused on conversion planning in three specific areas: The private sector, the Federal Government, and the States.

As it relates to private sector coordination, early in our Agency's life the Board held hearings to examine the actions being taken by some elements of the petroleum industry in converting their retail fuel dispensers from customary to metric dispensing. This was brought on by the escalating price of fuel in this country making the majority of computers in these devices, obsolete. Something had to be done and the Board felt it proper that we at least try to help gather the facts on such a conversion.

Since that time, the Board has developed, approved, and published in the Federal Register, "Planning Guidelines" which established the principles and procedures for groups that wish to prepare a metric conversion plan, and have it endorsed by the Board. These planning guidelnes were the product of over 16 months of effort involving extensive coordination with the entire constituency of potentially affected industries, organizations, and individuals. The result was a set of systematic steps for use in preparing metric conversion plans, and guidelines for assistance from the Board to conversion planners.

The efficacy of the Board's providing guidelines as well as assistance, in the major planning efforts underway, was demonstrated in the development of two industrywide conversion plans. The ANMC instruments sector conversion plan and the chemicals and allied products sector conversion plan were both developed using procedures designed to be compatible with the Board's guidelines. These plans were submitted to the U.S. Metric Board for review and potential endorsement in October 1981. Following an extensive review process which tested each plan's sufficiency and compatibility with the guidelines, they were endorsed by the Board.

The Board cosponsored a major planning and organizational symposium for the construction industry in Chicago in December 1980. That symposium was an unprecedented gathering of high level construction industry leaders for an indepth analysis of the costs and benefits of metric conversion to the construction industry.

Our initiatives in the Federal Government area have included organizations to monitor and coordinate metric activity by Federal agencies. The policy level committee, known as the Interagency Committee on Metric Policy [ICMP], was created in consultation with the Office of Management and Budget [OMB].

Additionally, the Board has supported and assisted the ICMP in developing a policy statement and guidelines on metric conversion for use by Federal agencies to insure that voluntary conversion occurs in an appropriate and cost beneficial fashion in the public interest, as the Congress intended when Public Law 94-168 was enacted.

In the area of State coordination, the Board developed an efficient and effective mechanism for consultation with the 50 State Governors and for coordination of metric information, plans and activities among the States; as well as between States, Federal agencies and private sector organizations. The State program evolved from a series of regional planning meetings and resulted in formation of the National Council on State Metrication [NCSM] with representatives appointed to the council by each State's Governor. The NCSM has met in each of the past 2 years and our original fiscal year 1982 plan called for a third meeting this July in Dallas, Tex. I regret to say that we have had to rethink this and it is now doubtful that this important organization will hold that meeting.

In a related matter, complementing our State planning and coordinating program, our Office of General Counsel has made available to the State attorneys general and legislative councils of the several States a metric legal information kit that includes information on the American Bar Association approved model law entitled "The Uniform Metric System Procedures Act" [UMSPA].

Before concluding, I must mention our metric standards program. Congress obviously recognized the important role of metric standards in engineering and production, for the Metric Conversion Act of 1975 contains three subsections (6.4, 6.5, and 6.6) which direct the board to: (1) Encourage the development of metric standards, as rapidly as practicable; (2) encourage retention of, in new metric language, superior U.S. engineering designs and practices, and (3) consult and cooperate with foreign governments and international standards organizations to gain international recognition of metric standards proposed by the United States.

Shortly after organization, the Board formed a Standards Liaison Committee to guide its standards program. The first effort was to establish contact with the standards community and set forth the stated intent of the standards provision of the act. This was accomplished by letters sent directly to over 400 standards developing organizations, and a series of liaison meetings with officials of the major public and private sector standards making organizations.

Recently, we followed up using questionnaires, and some personal interviews, with organizations cncerned with standards to develop a strategy for dealing with the subject of developing metric standards.

Mr. Chairman, I would like to say finally that metrication continues in this country, especially in the private sector, and will progress with or without the Board. However, the process will be made much more orderly, and much less costly, with a coordinating agency designated by Congress in this particular role.

A stronger mandate in legislation, albeit voluntary, and a metric board with a positive attitude, properly supported by Congress, could be cost-effective and in the best interests of our country.

I agree with my friend who just testified on behalf of the education community that this is undoubtedly one of the most important areas we must address. We have to acquaint the citizens of this country with this fine measurement system before we can expect them to understand and appreciate it.

I would like to conclude with a statement I heard recently that expresses well this need for education. It paraphrases a quote by the great American humorist, Will Rogers, and went like this: "I never met a man who knew the metric system that didn't like it."

Thank you.

Mr. **SHAMANSKY**. Thank you very much.

[The prepared statement of Mr. Andrews follows:]

STATEMENT OF SYDNEY D. ANDREWS, DIRECTOR, DIVISION OF STANDARDS, FLORIDA DEPARTMENT OF AGRICULTURE AND CONSUMER SERVICE

Mr. Chairman, I am Syd Andrews, member of the United States Metric Board representing the National Conference on Weights and Measures and standards making organizations.

In the area of Planning and Coordination, the Metric Board has focused on conversion planning in three specific areas: the private sector; the federal government; and the states.

As it relates to private sector coordination, early in our Agency's life the Board held hearings to examine the actions being taken by some elements of the petroleum industry in converting their retail fuel dispensers from customary to metric dispensing.

The Board has developed, approved and published in the Federal Register, "Planning Guidelines" which established the principles and procedures for groups that wish to prepare a metric conversion plan, and have it endorsed by the Board. These Planning Guidelines were the product of over 16 months of effort involving extensive coordination with the entire constituency of potentially affected industries, organizations and individuals. The result was a set of systematic steps for use in preparing metric conversion plans, and guidelines for assistance from the Board to conversion planners.

The efficacy of the Board's providing guidelines, as well as assistance, in the major planning efforts underway, was demonstrated in the development of two industry-wide conversion plans. The American National Metric Council [ANMC] Instruments Sector Conversion Plan and the Chemicals and Allied Products Sector Conversion Plan were both developed using procedures designed to be compatible with the Board's guidelines.

These plans were submitted to the U.S. Metric Board for review and potential endorsement in October of 1981. Following an extensive review process which tested each plan's sufficiency and compatibility with the guidelines, they were endorsed by the Board. The Board has already received a request from the Chairman of the ANMC Chemicals and Allied Products Sector Conversion Committee for additional assistance in implementing the Board Endorsed Plan.

The Board co-sponsored a major planning and organizational symposium for the construction industry in Chicago in December of 1980. That symposium was an unprecedented gathering of high level construction industry leaders for an in-depth analysis of the costs and benefits of metric conversion to the construction industry.

Our initiatives in the Federal government area have included organizations to monitor and coordiante metric activity by Federal agencies. The policy level committee, known as the Interagency Committee on Metric Policy (ICMP), was created in consultation with the Office of Management and Budget (OMB). Additionally, the Board has supported and assisted the ICMP in developing a policy statement and guidelines on metric conversion for use by Federal agencies to ensure that voluntary conversion occurs in an appropriate and cost beneficial fashion in the public interest, as the Congress intended when PL 94-168 was enacted.

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In a related matter, complimenting our State Planning and Coordinating program, our Office of General Counsel has made available to the State Attorneys general and legislative councils of the several states a Metric Legal Information Kit that includes information on the American Bar Association approved model law entitled "The Uniform Metric System Procedures Act" (UMSPA).

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Shortly after organization, the Board formed a Standards Liaison Committee to guide its standards program. The first effort was to establish contact with the standards community and set forth the stated intent of the standards provision of the Act. This was accomplished by letters sent directly to over 400 standards developing organizations, and a series of liaison meetings with officials of the major public and private sector standards making organizations.

Recently, we followed up using questionnaires, and some personal interviews, with organizations concerned with standards to develop a strategy for dealing with the subject of developing metric standards.

Mr. POLK. Mr. Chairman, our next speaker, and in acknowledging the immediate former speaker I should note that presently we operate strictly under a voluntary policy and there is no disposition on the Board as a whole that I know of at the present time to change that voluntary character.

I would like now to call on Andrew Kenopensky, whom I mentioned earlier in my first remarks today.

Andy, would you take over now.

[The biographical sketch of Mr. Kenopensky follows:]

ANDREW KENOPENSKY

Mr. Andrew Kenopensky is the Vice Chairman and represents labor on the United States Metric Board. He has been National Automotive Coordinator for the International Association of Machinists and Aerospace Workers, AFL-CIO, since 1974. Prior to that appointment, he held many positions in the IAM, including Organizer for Lodge 447 (New York and New Jersey) and Business Representatives for District Lodge 15 in 1966. Mr. Kenopensky served two terms as treasurer of the National Transportation Apprenticeship and Training Conference (NTATC), and was recently selected as Labor Chairman of NTATC. In 1977 he received the "Award of Excellence for Fostering Training in the Transportation Industry" from NTATC.

Mr. Kenopensky holds Associate Degrees in Labor Studies from Empire State College and Cornell University, a Bachelor of Science Degree in Labor Management from the State University of New York, and a Master's degree in Education from Rutgers University.

Mr. Kenopensky's term on the Metric Board expires June 14, 1984.

STATEMENT OF ANDREW KENOPENSKY, MEMBER, U.S. METRIC BOARD AND NATIONAL AUTOMOTIVE COORDINATOR, INTERNATIONAL ASSOCIATION OF MACHINISTS AND AEROSPACE WORKERS

Mr. KENOPENSKY. Thank you, Lou.

Mr. Chairman, I am Andrew Kenopensky, automotive coordinator for the International Association of Machinists and Aerosopace Workers and one of the AFL-CIO representatives to the Metric Board. I am here today wearing the hat of representative of the Metric Board to give you a brief view of the research projects that the U.S. Metric Board has conducted and is continuing to conduct.

In the period from the establishment of the U.S. Metric Board to the present—or about 3 years—the Board has initiated 17 research studies. Most have been contracts with small business or minority-owned research firms; some have been carried out by the Board's staff. At this time, seven projects are still active, principally in the final analysis and report writing stages, and the program will result in 24 reports, many of which you see here on the table. With your permission we would like to have our staff provide this Committee with the entire number of reports for your information.

Mr. WALGREN. We will be glad to have those reports for the Committees review.

Mr. KENOPENSKY. The point of departure for the research program plan was the Metric Conversion Act of 1975. Congress suggested a series of topics and issues that should be addressed by the research of the Board. I am pleased to report that our comprehensive research program dealt with practically all of the suggested topics.

As a result of the emphasis the Congress placed on them, the areas particularly targeted by the research program were: Statutory barriers to metric conversion, the effects of metrication on occupations and workers, and the effects on small business. I would like to summarize the Board's findings on these topics to give you an indication of the accomplishments of the program, and then discuss more generally the implications of the research and the effect cutting off our activities will have on the Nation's knowledge base. A full picture of the Board's research findings will be placed in the record to cover topics and issues examined in addition to those commented on here.

With respect to legal and regulatory barriers to metrication, we have found, as reported to Congress earlier, that while legal impediments and annoyances prevail throughout the various jurisdictions of the country, there are few legal barriers to metrication. Further, there is no current requirement for any new structural mechanism for converting customary units to metric units in statutes, regulations and other laws.

In addition, business firms, particularly the largest manufacturing firms and the leaders in private-sector initiated conversion do not see laws and regulations as real impediments to metrication, but do "take into consideration" certain laws when planning conversion. Antitrust issues and building codes are the two areas of greatest concern. Fair packaging and labeling, and weights and measures laws are of lesser concern.

With regard to small business, problems encountered in the process of converting to the use of the metric system have been met and resolved generally with resources from within the business community and with little economic or operational trauma. This has been questioned until now. Metric conversion occurs in the context of many other business decisions on equipment, customer needs, worker relations, finances and relations with suppliers and other companies. Metric conversion, while often an important consideration, is rarely a primary concern in manufacturing decisions.

The capability of small manufacturers to produce to metric dimensions is widespread but shallow. This could not be validated until now.

Investments in metric production are routine, insubstantial and difficult to isolate from other business costs. The costs of conversion diminish in comparison to small businesses' concerns with inflation, energy and material costs, interest rates, and general economic conditions. Small businesses see their metric production as neither voluntary nor forced, not a search for new business markets or other benefits, not dictated by any one company, but rather a result of general industry trends.

Small manufacturers are flexible; they use a rich array of management and manufacturing practices to produce metric products. This also could not be validated until now.

With respect to occupations and workers, an area of great concern to myself as the automotive coordinator of the International Association of Machinists and Aerospace Workers, we have found that, while many occupations are measurement sensitive and hence may be affected by metrication, an equal number are not measurement sensitive.

Workers in certain industries, where it is the norm that the worker own tools—for instance, automotive maintenance and repair—have borne and will continue to bear a burden when they are required by their employers to convert to metrics and to purchase tools. Many such workers are unaware of, or are unable to avail themselves of, legal income tax deductions for the cost of metric tools required for their jobs. We have called this finding to the attention of the Congress and the President, as required by the act.

Training for use of metric measurements on the job is usually provided and paid for by employers. Some workers experience anxiety when faced with conversion in the workplace; older workers are especially prone to such concerns. After training, however, anxiety decreases and disappears. Overall, we feel we have a good understanding of the costs of conversion—both in terms of money and the intangibles such as anxiety, fear, dislocation and the like.

Unfortunately we cannot testify that all necessary research is complete. There is a large area of unknown that we are concerned about. The costs of not converting, the opportunity costs of not working in the metric system, the national benefits of conversion, the more subtle costs of maintaining multiple systems of measurement. We are just beginning to explore—through studies of econometrics, the national system of accounts and international trade—some of these issues.

A fair generalization summing up our findings would be to say that the earlier perceived problems of conversion to the metric system have largely evaporated when studied. Legal barriers appear to be nominal. Disruption and inconvenience to both small and large business appear inconsequential; and where occupational costs or inconveniences were found, our research has shown creditable estimates of the scope, amount and location of the costs so that they may be addressed and minimized before the fact.

Our earlier work has shown that the perceived barriers to metrication are far less than originally contemplated. We would prefer to report to you, but cannot, on the extent and effect of the costs to the United States of continuing to support two primary measurement systems and the appropriate sectors of the economy that may benefit from thoughtful consideration of abandoning one or the other of the current systems. I believe the answer would have shown the relevant costs and benefits of maintaining two primary measurement systems to be far more than originally contemplated.

Thank you very much.

Dr. Polk. Thank you very much.

Mr. Walgren. Thank you very much.

[The prepared statement of Mr. Kenopensky follows:]

STATEMENT OF ANDREW KENOPENSKY

Mr. Chairman, I am Andy Kenopensky, Automotive Coordinator for the International Association of Machinists and Aerospace Workers and one of the AFL-CIO representatives to the Metric Board.

In the period from the establishment of the United States Metric Board to the present—or about 3 years—the Board has initiated 17 research studies. Most have been contracts with small business or minority-owned research firms; some have been carried out by the Board's staff. At this time, seven projects are still active, principally in the final analysis and report writing stages, and the program will result in 24 reports many of which you see here on the table. With your permission we would like to have our completed work to-date made part of the record.

The point of departure for the research program plan was the Metric Conversion Act of 1975. Congress suggested a series of topics and issues that should be addressed by the research of the Board. I am pleased to report that our comprehensive, research program dealt with practically all of the suggested topics.

As a result of the emphasis the Congress placed on them, the areas particularly targeted by the research program were: statutory barriers to metric conversion, the affects of metrication on occupations and workers, and the effects on small business. I would like to summarize the Board's findings on these topics to give you an indication of the accomplishments of the program, and then discuss more generally the implications of the research and the affect cutting off our activities will have on the Nation's knowledge base. (A full picture of the Board's research findings will be placed in the record to cover topics and issues examined in addition to those commented on here.)

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Training for use of metric measurements on the job is usually provided and paid for by employers (generally, metric tools are also purchased by the employers, as well).

Some workers experience anxiety when faced with conversion in the work place; older workers are especially prone to such concerns. After training, however, anxiety decreases and disappears.

Overall, we feel we have a good understanding of the costs of conversion—both in terms of money and the intangibles (such as anxiety, fear, dislocation, and the like).

Unfortunately we cannot testify that all necessary research is complete. There is a large area of unknown that we are concerned about. The costs of not coverting, the opportunity costs of not working in the metric system, the national benefits of conversion, the more subtle costs of maintaining multiple systems of measurement. We are just beginning to explore—through studies of econometrics, the national system of accounts, and international trade—some of these issues.

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Dr. **Polk**. Now it is my pleasure to call on our Board member Ms. Sandra Kenney.

[The biographical sketch of Ms. Kenney follows:]

SANDRA KENNEY

Ms. Sandra Kenney, an at-large Member of the United States Metric Board, is On-Air Promotion Director for the Maryland Center for Public Broadcasting. She has produced a series of 20 one-minute television "spots" called "Measure for Measure." The nationally distributed series offers a lively format for instruction of the fundamentals of the metric system.

Ms. Kenney was born and educated in Ohio, and was graduated from Kent State University with a B.S. degree in art education. She has taught elementary art in Ohio and in Baltimore, Maryland, and college-level art education and television production and techniques.

Ms. Kenney became the television art demonstration teacher for the Baltimore City Public Schools in 1967, and joined the Division of Instructional Television for the Maryland State Department of Education in 1970. She has been with the Maryland Center for Public Broadcasting since 1974.

Ms. Kenney's term on the Metric Board expires March 23, 1982.

STATEMENT OF SANDRA KENNEY, MEMBER, U.S. METRIC BOARD AND PROMOTION DIRECTOR, MARYLAND CENTER FOR PUBLIC BROADCASTING

Ms. **Kenney**. I hope I don't sound like Victor Borge.

Mr. Chairman, I am Sandra Kenney, the "On-Air Promotion Director" for the Maryland Center for Public Broadcasting, a member at large and former chairman of the Metric Board's Public Awareness and Education Committee. Section 6(7) of the Metric Conversion Act directs our Board to:

> Assist the public through information and education programs, to become familiar with the meaning and applicability of metric terms and measures in their daily life.

To be candid, Mr. Chairman, it is extremely difficult to educate and inform the American public on any issue with very limited resources and in a short period of just 4 years. But with the funds we have received, we are pleased to point to the following accomplishments:

The map of the United States on your right shows where the U.S. Metric Board has held bimonthly public forums to receive comments from the private sector and citizens relating to ongoing conversion or to the issue in general. The multicolored dots represent the hundreds of newspaper, radio, and TV interviews conducted by members and staff to establish the identity and role of the Board, and the voluntary nature of conversion, and to promote understanding of the use of metric terms.

We have printed and distributed to the public educational materials explaining not only this country's national policy on metric, but how to use the metric system as well. With your permission, we would like to make some of these materials part of the record at this time.

Also, to date our public awareness program has secured well over 200 TV and radio interviews with Board members and staff and has reached a potential audience of 150 million people through all media sources.

In 1980 and 1981 the Metric Board planned and coordinated National Metric Week which reached, through schools, museums, industry, and public information posters, an estimated potential audience of 45 million. This program was selected for study as one of the year's outstanding public relations efforts.

We have raised public awareness by participating in special events such as: First, March of Dimes Walk-a-Thon; and second, Special Olympics.

We have developed and distributed specific public service announcements for: First, Winter Olympic games—radio used by ABC network; and second, liter dispensing of gasoline—radio and TV carried by networks, free of charge.

We have developed and distributed a weekly public service radio series entitled "Metric Magazine" which has been placed in all major media markets and with over 500 radio stations, free of charge.

We published a document entitled, "Metric Usage Study: A Look at Six Case Histories" detailing both problems and opportunities in metric conversion.

We have organized and conducted metric training seminars for private industry, Government employees, and congressional aides.

We have produced and distributed 11 television public service announcements to 200 stations and are very gratified to report that they are enjoying "prime time" coverage, free of charge, particularly in Washington, D.C., I might add.

With respect to our television PSA's and with the committee's permission, we would like now to show for you three TV public service announcements produced and distributed by the Board's staff, just three of the 11 we have done. All three have been aired by networks and affiliated stations.

The first was produced in direct response to an actual conversion activity.

The second is one of a series of educational spots to familiarize the public with the meaning and use of metric terms in daily life. It incorporated also a new technology called "closed captioning" for the hearing impaired.

The last spot is one designed for advance showing in cities where the Board scheduled meetings and public forums in the way of informing them we were there and wanted to hear from them.

I would like to roll the spots.

Mr. **WALGREN**. If I could stop just 1 minute. How long do they take?

Dr. **POLK**. One minute each.

Mr. **WALGREN**. OK. Then let's do it now.

Please proceed.

[TV spots are shown.]

[The prepared statement of Ms. Kenney follows:]

STATEMENT OF SANDRA KENNEY, MEMBER OF THE U.S. METRIC BOARD

Mr. Chairman, I am Sandra Kenney, "On-Air Promotion Director" for the Maryland Center for Public Broadcasting, a Member at large and former Chairman of the Metric Board's Public Awareness and Education Committee. Section 6(7) of the Metric Conversion Act directs our Board to "assist the public through information and education programs, to become familiar with the meaning and applicability of metric terms and measures in their daily life.

To be candid, Mr. Chairman, it is extremely difficult to educate and inform the American public on any issue with very limited resources. With the funds we have received, we are pleased to point to the following accomplishments:

The map of the United States on your right shows where the U.S. Metric Board has held bimonthly Public Forums to receive comments from the private sector and citizens relating to ongoing conversion or to the issue in general. The multicolored dots represent the hundreds of newspaper, radio and TV interviews conducted by Members of my staff to establish the identity and role of the Board, and the voluntary nature of conversion, and to promote understanding of the use of metric terms.

We have printed and distributed to the public, educational materials explaining not only this country's national policy on metric, but how to use the metric system as well. With your permission, we would like to make some of these materials part of the record at this time.

Also to date our public awareness program has secured well over 200 TV and radio interviews with Board members and staff and has reached a potential audience of 150 million people through all media sources.

In 1980 and 1981 the Metric Board planned and coordinated National Metric Week which reached, through schools, museums, industry and public information posters, an estimated potential audience of 45 million. This program was selected for study as one of the year's outstanding public relations efforts.

We have raised public awareness by participating in special events such as: (1) March of Dimes Walk-a-Thon; and (2) Special Olympics.

We have developed and distributed specific *public service announcements* for: (1) Winter Olympic Games—radio used by ABC network; and (2) Liter Dispensing of Gasoline—radio and TV carried by networks, free of charge.

We have developed and distributed a weekly public service radio series entitled "Metric Magazine" which has been placed in all major media markets and with over 500 radio stations, free of charge.

We published a document entitled "Metric Usage Study: A Look at Six Case Histories" detailing both problems and opportunities in metric conversion.

We have organized and conducted metric training seminars for private industry, government employees, and Congressional aides.

We have produced and distributed eleven television public service announcements to 200 stations and are very gratified to report that they are enjoying "prime time" coverage, free of charge.

With respect to our television PSA's and with the Committee's permission, we would like now to show for you three TV public service announcements produced and distributed by the Board's staff. All three have been aired by networks and affiliated stations.

The first was produced in direct response to an actual conversion activity.

The second is one of a series of educational spots to familiarize the public with the meaning and use of metric terms in daily life. It incorporates also a new technology called "closed captioning" for the hearing impaired.

The last spot is one designed for advance showing in cities where the Board scheduled meetings and public forums.

Roll them, please.

Mr. **Walgren**. That wasn't really Howard Cosell, was it? Well, thank you very much for the presentation. I apologize for having gone perhaps longer in earlier parts of the hearing. We will try to complete the record perhaps through some short written questions to you.

If there is anything further you would like to consider making it part of the record.

Dr. **Polk**. Thank you very much, Mr. Chairman. We appreciate all of this.

[Whereupon, at 12:25 p.m., the subcommittee adjourned subject to the call of the Chair.]

APPENDIX I

Questions and Answers Submitted for the Record by the U.S. Metric Board

1. Our policy with respect to adoption of Metric has been that it is voluntary. Based on our experience to date, would you continue that policy, or do you see any merit in introducing stronger measures to insure that the conversion takes place faster?

Our present national policy of voluntary metric conversion has worked quite well, and it is our view that the American people would resist any effort to mandate change to another predominant measurement system. At the same time, we believe that Congress should consider examining P.L. 94-168 for the purpose of issuing a definitive course of action concerning whether or not it will be this country's plicy to convert to metric.

2. The original Metric Study conducted by the National Bureau of Standards just over 10 years ago recommended that the goal of the Metric Board should be that the U.S. become "predominantly, but not exclusively, Metric" over a 10 year conversion period. Although the Congress did not accept that recommendation in 1975, would you feel that we should reexamine our rejection of the recommendation now?

If the Congress were to determine that it was in the best interest of this country to convert to the metric system, then we believe it would be helpful to set "timeframes" by which to insure that sector conversions were accomplished without economic disruptions. Whether this period of time be ten years or fifteen or twenty years, this is a subject that should be determined in consultation with the private sector and all affected groups. The fact remains, however, that without a mutually agreed to "timeframe", planned and coordinated conversion will not occur.

4. Several studies have concluded that if conversion to Metric slows down at a point where the nation would be faced, in effect, with a dual system of measurements, it might become desirable for the Congress to make one system clearly the preferred one. Are we, in your view, approaching such a situation?

Our inital studies have not so concluded, principally because our efforts, through the early period of the research program, were focused on specific societal groups potentially "at risk" under metrication (e.g., small business, workers, and consumers) and a few broader national policy issues (e.g., the role of Federal procurement in metrication).

We have just begun to explore the larger, more integrative issue of the relationships between metrication and the economic health and well-being of the nation. Particularly relevant, information just now being analyzed tells us, for example, that there is a significant and growing demand for metric-capable machine tools in the U.S.; the automotive industries are the leaders in this demand process. Concurrently (and not necessarily casually related), American manufacturers are experiencing a declining share of the overseas market for machine tools (the overseas market is four times larger than the U.S. market). Most overseas sales are for metric-capable products. Several large U.S. machine tool manufacturers have introduced new metric-capable products and have increased their international efforts to try to capture a large share of that market. Those with overseas subsidiaries and affiliates are introducing metric-designed and metric-capable machine tools and are giving added impetus to converting U.S. production to metric machine tools.

If this process continues as it currently appears, the notion of a preferred system (i.e., metric) will come about in this sector withou the necessity of any Legislative action. Clearly, a more convenient situation.

Although our research has not yet reached the issue, the National costs or undesirability of dual systems of measurement over a protracted period may well depend on the nature of how the duality exists in our economy. There is reason to believe that dual systems *within* *each* of our predominent sectors is more expensive or disruptive than a duality introduced by having *some* sectors wholly metric and *other* sectors wholly customary.

If further research (which the Board had proposed) showed we were reaching a situation imposed by the question, then, yes, it might be desirable - through Legislation, if the available alternatives fail, - to make one system a preferred system. *However*, it must be recognized that metric when introduced through any mechanism should *not* be considered an all-or-nothing question for the *entire* U.S. economy - it probably *should* be considered as an all or nothing question for *each* major sector within the economy. Any potential Legislative action recommended should be compatible with this approach.

6. The Metric Act provides that the Board shall cease to exist "when the Congress determines that its mission has been completed," in your view, can we at this time foresee (a) how the Board's work can be called "completed", and (b) when that will occur?

The board believes that we need two more years to complete our work and relayed this to the Administration in our FY 1983 OMB submission. This would allow the Board to concentrate its efforts on the implications of current National metric policy and to identify those sectors of the economy where metric usage may become critical to America's ability to compete in world-wide markets.

7. In the event it should come to pass that the U.S. Metric Board is entirely "defunded", as proposed in the President's budget, what, in your view, would be the effects, nationally and internationally?

There is no doubt that the abolishment of the U.S. Metric Board will be viewed by both American industry and our trading partners as a retreat from the national policy adopted by the Congress and expressed in P.L. 94-168.

As we mentioned in our statement, spurred by the new fiscal policies, tax reductions, and depreciation schedules of this Administration, many in the private sector are anxious to participate in the reindustrialization of America. As long-term capital investment decisions are made, and they cannot be deferred, lack of a clear cut signal from the Federal government on metric policy may cause serious economic consequences that will have long-term impacts on productivity and U.S. competitiveness in foreign markets.

Our trading partners have always looked to this country as a technological giant and leader in world trade, and the elimination of the Board will no doubt cause uncertainty among the 98% of the world community that use the metric system in commerce.

9. Our Northern neighbor, Canada, has substantially completed a conversion to Metric which was begun about the time we in the U.S. began. What lesson can we, in your opinion, learn in this country from the Canadian experience?

One important aspect of our northern neighbor's conversion was a strong and determined commitment by Ottawa to manage the nation's affairs, and in this case, its measurement system. Another factor which contributed to efficient conversion was the availability of sufficient financial resources to make the public aware of the change through substantial periodical publications and public awareness materials and to involve the private sector directly in con version planning under the sponsorship of Metric Commission Canada.

10. The Metric Act directs the Board to encourage the adoption of Metric in one specific area: Engineering Standards. What progress has been made to carry out that provision?

The Board established a Standards Liaison Committee in 1979 to interpret and develop a Board approach to satisfying this mandate. (Later this Committee was incorporated into the Board's Coordination and Planning Committee). The Committee sent letters to each of the more than 400 standards bodies to advise them of the Board's role and its desire to work with the standards community. The Committee Members and Board staff personally approved and gave speeches on the Board's standards role before several societies like the American Society of Engineering Education, the Aerospace Sector Committee of the American National Metric Council, and the Interagency Committee on Standards Policy.

In FY 1980 and 81 the Board funded a modest contract in its standards program and engaged a knowledgeable consultant to assist in compiling the strategy and recommendations.

The Board will consider for approval at its July 1982 meeting a report on standards and recommendations to satisfy paragraphs 6(4), 6(5), and 6(6) of the Act. The report is based on the following Board actions:

1. A current survey of all known standards development organizations in the United States.

2. Interviews with nine selected major standards developing organizations.

3. A survey of standards preparing activities in Federal agencies, principally the Department of Defense.

4. Interviews with other interested parties in the standards community such as the American National Standards Institute, a Federal interagency metric standards committee and a private sector metric standards ad hoc committee.

The report will deal with determining the demand for metric standards, how the standards developing bodies respond to the demand, the barriers to development and use of metric standards, and the extent to which many U.S. originated standards are at a disadvantage internationally because they are not metric.

Subsequent Board actions on the report's recommendations will be determined by the Board.

11. We are aware that certain industries have long been entirely metric. These include the photo equipment industry, pharmaceuticals, and the firearms industry. Have any comparable industries achieved similar dominance of metric in the last 5 years?

The concept of dominance is difficult to deal with, as we have found in our attempts to assess the status of use of metric measures in the U.S. A variety of possible scales have been used; two such scales are the fraction of sales income that is due to metric products and the portion of production (number of production units) that is metric. A totally different set of reference points come from assessing where a company or industry is with respect to the metric conversion planning process (e.g., analyzing the market, establishing company policy, training employees). Given all that, data now available, incorporating all of the reasonable scales, in a variety of ways, allows us to give some estimate of the extent to which American industry is embracing the metric system. (Also see the response to Question 12, below.)

Except for the large manufacturing firms (e.g., automotive) that make their own decisions in their own best interest, and particular industries that have elected to convert for collective reasons (e.g., the wine and distilled spirits industries), conversion is in response to customer demand. If most of the customers of a supplying firm call for metric products (e.g., automotive parts manufacturing), then most of the supplying firm's output will be in metric units. Such apparently occurs only rarely; most suppliers deal with a number of customers, even in the automotive field, and not all customers require metric products. Thus, although much of the major automobile manufacturers' output is now or is rapidly approaching metric, the widespread supporting industry (components, tooling, parts) is not dominantly metric but rather metric-on-demand. Similarly, while the wine and distilled spirits industries package all of their products in metric sized containers, the other part of the industry, feeding in raw materials or providing products to other industries as well (e.g., bottle manufacturers who sell to the wine and distilled spirits industries but who also sell to the soft drink, fruit juice and other bottle-using businesses) are not so converted.

In summary, the larger corporations invariably lead the conversion. Except for "captive" smaller industries, the feeder industries convert only that portion of their production needed to maintain their market. Conversion appears to occur at a slow, stady pace, which minimizes direct economic and industrial costs. The specific large industries which clearly, by any reasonable measures, are dominantly metric are the large automobile manufacturing firms, farm machinery manufacturing firms, and the wine and distilled spirits producers.

12. We understand that the three big automobile manufacturers are now converting to metric. Is there any other industry where a majority of the member firms are going to metric?

An overview of U.S. industrial conversion to the metric system was carried out under the direction and guidance of the Metric Board in 1979. This anlysis was compiled by major groups of industries, subgroups of industries, and also, when necessary, by specific individual industries. The results of the overview showed that two industries were essentially fully converted: (1) radio and TV receiving equipment (hard conversion) and (2) communications equipment (telephone, telegraph, radio, and TV transmitting apparatus) (soft conversion).

It was not possible to establish where the "majority" of an industry was metric, but the analysis disclosed that industries which are partially converted, both hard and soft and to widely varying degrees are food and kindred products; textile mill products; furniture and fixtures; pulp mills; paper mills; miscellaneous converted paper products; paperboard containers and boxes; building paper and board mills; book publishing; blank books and book binding; chemicals and allied products; glass containers; iron and steel foundaries; cutlery, hand tools and hardware; bolts, nuts, rivets and washers; farm and garden machinery; construction and related machinery; metalworking machinery; special industry machinery, general industrial machinery; special industry machinery; office and computing machinery; refrigeration and heating equipment; household appliances; electronic components and accessories; X-ray apparatus and tubes; transportation equipment; engineering and scientific instruments; optical instruments and lenses; medical instruments and supplies; ophthalmic goods; photographic equipment and supplies; watches, clocks and watch cases. A number of industries are listed as currently planning for conversion, and others in which no metric headway is seen. The former group includes building and heavy construction trades, lumber and wood products, and valves and pipe fittings. Within the latter group are found metal mining, apparel and other textile products, and publishing.

A number of industrial and trade association surveys conducted throughout the Metric Board's existence, which the Board is aware of, generally have findings that parallel closely those just presented.

In the final analysis, it is our general observation that metric activity is greatest in the machine and fabricated metal products industries. Few inroads have been made in the highly diffuse consumer industries.

13. Has there, to your knowledge, been any cases of industrial sectors or individual firms which initially went Metric only to convert back later to the customary system?

There have been several companies which had announced a commitment to convert their products tc metric that failed to do so when no clear national policy was forthcoming. One example was Sears and Roebuck whose President and Chief Executive officer announced publicly in 1978 that Sears would be metric in all product lines by 1985. Sears has since retracted this policy for when it appeared to them that unilateral action would be premature and potentially costly.

There have been other companies which reduced or terminated aggressive product line conversion when they discovered that suppliers were not converting as expected, were adopting a cautious attitude toward metric usage, or completely abandoned previous plans. Two companies which fall into this category are Union Carbide and Allied Chemical Company.

One known case of a company actually converting to metric then back to customary measurement was Samual Cabot Inc., a manufacturer of paints and stains. Persuaded by what appeared to be a national policy of metric conversion and expanded foreign markets, Cabot began using the metric system only to be forced to abandon metric because sufficient suppliers of metric containers were not available.

14. The Metric Board has recently formally endorsed two metric conversion plans, one for the chemical industry and one for the instrument sector. What are the practical effects for individual companies of these formal Board endorsements?

The conversion plans recently endorsed by the U.S. Metric Board are intended to facilitate a smooth conversion to the metric system in industries they represent.

The Board's endorsement of the Chemical and Allied Products, and the Instrument industry's plans signifies to individual companies that the planning process conformed to the guidance of P.L. 94-168, and the subsequent planning guidelines required to be published by the Metric Board under this Act. The endorsement hearing was conducted in open and lawful environment and took into account the concerns of all affected parties. Futhermore, the hearing and endorsment process assured the companies that the Plan is widely known and accepted by their industry.

In a wider perspective, endorsement of these plans immediately followed by termination of the Metric Board which was largely conceived for this purpose could be significantly misinterpreted by the interested private sector as a sign that the Administration is not fully supportive of metrication planning and conversion.

15. The Metric Council recently completed work in Metric conversion plans for two sectors, chemicals and instruments, and these plans were endorsed by the Metric Board. Yet, in 1979, in addition to the plans for these two industries, it was reported that a number of other industry groups were working on Metric plans, including metals, aerospace, agricultural equipment, and medical devices. What progress is being made to having these plans formally endorsed by the Board?

Since 1979, the Board has published the "Private Sector Metric Conversion Planning Guidelines (15 CFR 504) which guide the process and format of plans submitted to the Board. Subsequently, ANMC updated its procedures and guidelines for the development of industry plans. These were carefully evaluated by the Metric Board and found to be compatible with the published Board guidelines.

Therefore plans now under development by ANMC should be progressing toward submission for review and possible endorsement by the USMB. Of the plans which ANMC has indicated are in advanced state of preparation or are nearing completion, the four plans previously noted are included as well as the Construction Industries Coordinating Group's Plan.

ANMC's procedures make the decision to submit a conversion plan to the Board for review an individual industrial sector committee decision as was the case with Chemicals and Instruments plans. There is every indication at this time that other committees will follow the precedent established by the Chemicals and Instruments Committees by submitting their plans to the Board as they are completed.

16. In the matter of changing the selling of gasoline from gallons to liters, where do we actually stand? What percentage, in rough terms, of the nationwide gas sales are now based on the liters? Have any states or oil companies converted to liters for gas sales?

Approximately 20% of the gasoline service stations in the United States measure gasoline by the liter. Since it is the oil industry's decision to convert, one cannot say that any states converted the gasoline sales, but states did convert their associated regulations to accommodate companies and distributors who made the decision to convert, and new state legislation (e.g. Minnesota) was passed that provided for liter based sales if that was necessary. Three major oil companies and many small and medium sized companies converted to liter sales at retail outlets.

17. The first imported automobile to enjoy widespread success in the post-war period was the Volkswagen "beetle" which required Metric tools for much of its repair work. To what extent are the Japanese automobiles now on the U.S. Market also built in Metric dimensions?

The Japanese automobiles now on the U.S. market are built almost entirely in the metric system and metric tools are required for substantially all repair work. The sheet metal and mechanical components and fasteners, for example, are metric, whereas wheel and rim sizes are in inch-pound dimensions.

19. Please provide some specific examples of Metric conversion activities at the State and local government level.

20. Since our oversight hearing in November 1979, what decisions, pro and con Metric have been taken by the individual States?

A. The questions above are quite similar in nature and have been consolidated. For question 19 (activities) we have chosen to designate functional coordination or organizational activities taking place at the State level; while for question 20 (decisions) we are designating various actions, of which the Board is aware, that have been taken by State governments to support actual conversion or reduce barrier to specific conversions.

For coordinating or organizational activities noted above (question 19), State metric conversion activities have been generally reflective of USMB activities in a positive way. Specifically, all 50 Governors appointed a State Metric Representative to establish liaison with the U.S. Metric Board. Many States, working with the staff of the Board, are planning to or have set up State Metric Councils (seventeen active at present). There has been active support from the States for both the concept and organization of the National Council on State Metrication (two annual meetings have been held and a third is planned). The States have been fully responsive to our solicitations for information in support of the seven-volume publication which forms the foundation for the State Metric Clearinghouse, the State Metric Status Reports.

On the other hand several States have disbanded (or allowed to atrophy) their State metric committees because of the period of inactivity between the 1975 Act and the staffing of the Board.

In the area of metric law, State representatives to the American Bar Association developed a Uniform Metric System Procedures Act for consideration by the State legislatures. A few States have considered UMSPA in legislative committees, but currently none have enacted it. Several states have also commissioned studies on the States accommodation to increased metrication.

With regard to conversion supportive decisions made by States in areas of specific need for metrication - (Question 20), these fall into three major areas:

1. Changes in Weights and Measures regulations and in several cases, legislation, to allow for sales of gasoline by the liter.

2. Changes in State tax laws to be consistent with the sale of wines and distilled spirits in metric containers.

3. Direction by or to the State Board of Education in most States to have instruction in the metric system within the State schools. Now, all States teach metric at various education levels, primarily the elementary grades. Some textbooks now go so far as to deal solely in metric terminology.

There has been State activity in several other areas. For example in transportation, many states have State funded highway signs showing both metric and inch-pound designations. Federal legislation does not allow solely metric signs to be placed with Federal funding.

21. Within the agencies of the Federal Government, to what extent has there been an increased use of the Metric system since 1978? Please provide examples.

Because of critical program needs, several agencies, such as the Department of Defense and the Department of Agriculture, have had to proceed with metrication on their own before 1978. Subsequently, there were cases where metrication in some agencies had not made the necessary metrication coordination and adjustments. These internal activities - or lack of them - showed the necessity of interagency coordination. In response, the Interagency Committee on Metric Policy (ICMP) was created by the Board on October 18, 1978.

As a result of approval by the ICMP and the U.S. Metric Board, The Metric Conversion Policy for Federal Agencies and the supporting Federal Agency Guidelines for Implementation of Metric Conversion Policy were published in the Federal Register on April 30, 1981. The policy states that Federal agencies shall conduct their metrication activities in a coordinated manner consistent with the Metric Conversion Act and compatible with metric conversion trends in the nation. Agencies have two roles to play in metrication:

1. when the agency needs to take a metrication initiative, it shall do so in the public interest and with consideration of the private sector and States and local governments (active role)

2. Take appropriate internal Agency actions to adapt to metrication initiatives from the private sector (passive role)

Several examples of the Federal Active role are cited:

1. Department of Defense weapons

   The DOD/NATO requirements for interoperability is creating increased use of metric dimensions in weapons systems. A list of selected DOD metric projects since 1978 is as follows:

AAH Armed Attack Helicopter (DoD Hughes)

AMRAAM Advanced Medium Range Air-to-
Air Missile (Raytheon/Hughes -- AF

AASH Pilot Night Vision System (AVSCOM)

AASH Target Acquisition System (AVSCOM)

A/C Detection and Evaluation (ARPA)

ACM Aircraft Cluster Rocket

AN/TPS-58 Radar (DoD) 90% metric

ATLIS II (Martin Marietta, Orlando/
Thomson CSF, France)

BURRMS, Study Contract (Lockheed - NAVAIR)

ETF Enhanced Tactical Fighter study
(Grumman -- AF)

Ground Support Rocket System (MICOM)
(Vought, UTC -- 100% metric (soft)
Prototype)

GSR General Support Rocket System
(Vought, Boeing)

Hellfire Missile System (Rockwell)

Hydrofoil, Advanced Technology Lift
& Propulsion study (Grumman -- USN)

Marine Integrated Fire and Air Support
Systems (UTC, Norden Division
- Naval SEa System Command -Prototype
100% metric (soft)

MX Missile (Aerojet, Autonetics, AVCO,
Boeing, Charles Stark Draper Labs,
Hercules, Honeywell, Martin Marietta,
Northrop, Rocketdyne, TRW -- AF/BMD)

Navy Trainer RFP

PHM Patrol, Hydrofoil, Missile
Preferential Multiplexer/Experimental

Information Converter
(UTC, Norden Division, Naval Sea System
Command, Prototype, 100% metric (soft)

Roland Missile System (Boeing/Hughes -
Army/Micom - 95% metric.

RUMIC, Study Contract (Lockheed - NAVSEA)

SINGARS Single Channel Ground/Airborne
VHF Radio

Vehicle Rapid Fire System (DoD) 100% metric

Viper Missile System (General Dynamics -- Army
15% metric - warhead entirely metric to
permit joint US/NATO Operation & support

VISTOL Conposites (Vought Corp. NAVAIRSYSCOM)
Development contract 100% metric - currently
in work.

VTX Navy Trainer Proposal

XM-1 Tank 5-7% Metric (DoD - Chrysler)

XM-230E Gun (DoD 80% Metric)

In response to these Aerospace/NATO joint project requirements, the DOD has initiated a project to have metric versions of all DOD specifications and standards by 1990. The DOD also announced in 1981 a plan for replacing the Colt .45 handgun with metric caliber handguns.

2. The Bureau of Reclamation in the Department of the Interior is now designing and constructing some projects in metric units. The Bureau believes that because of the long life of these projects (e.g. dams, aquaducts, conduits, pumping plants), these strucures will be operating in a metric environment during much of their useful lives.

Several examples of the Federal passive role are cited:

1. Agency Reports

Where appropriate, agencies accept metric units in reports. For example, the Department of Agriculture uses metric units in its summary economic data sheets. Several agencies require metric units in press releases in conjunction with customary. The ICMP developed "Guidelines for Converting Measurement Units in Agency Press Releases to Metric Units" because the Federal agencies have been inconsistent in the use of metric terminology in press releases, and because these has been a visible and increasing use of metric terminology among the clients of Federal news sources.

2. Standards and Specifications

Many agencies are now inserting metric units in standards and specifications when they are revised. Examples include:

a. Fire Protection standards in sub-part of OSHA's General Industry Standards (CFR 1910)

b. New metric safety standards for tires and auto parts.

c. New international air navigation standards under the International Civil Aviation Organization

3. Regulations

Several agencies have amended regulations requiring dual units in regulations. Examples are:

a. Customs regulations to allow designation in metric of merchandise for customs duties and internal revenue taxes.

b. Metric regulations in rules of the Consumer Product Safety Commission.

c. Dual units in Rules of the Federal Communications Commission.

APPENDIX II

STATEMENTS FOR THE RECORD SUBMITTED BY NATIONAL TEACHER ORGANIZATIONS

NATIONAL COUNCIL OF
Teachers of Mathematics
NCTM
1906 Association Drive, Reston, Virginia 22091 ■ (703) 620-9840

February 8, 1982

Honorable Doug Walgren
Chairman
Subcommittee on Science
U.S. House of Representatives
Washington, D. C. 20515

Dear Mr. Chairman:

If it is possible, would you have the following statement included in the record for your subcommittee's oversight of metric conversion.

Also, as per your request, enclosed is our communications with the President concerning the status of metric education.

Sincerely,

Richard Long
Government Relations Specialist

NATIONAL COUNCIL OF
Teachers of Mathematics
N C T M
1906 Association Drive, Reston, Virginia 22091 ■ (703) 620-9840

A METRIC POSITION

Virtually the entire world has gone metric! The United States stands out as the only industrialized country in the world that still clings to the traditional English system of measurement--placing us at a distinct disadvantage in international commerce and scientific endeavors. Indeed, experience has shown that other countries have been able to make the change to the metric system when preceded by an adequate program of public education.

The public schools of our country have taken the first and most important step --they are educating the youth in our schools who will become the citizens of the twenty-first century. An introduction to the metric system can be found as part of the curriculum guidelines in virtually every school system throughout the United States. As a result, every major commercial textbook publisher has incorporated metric materials for instruction throughout all elementary and secondary mathematics textbooks. Our elementary school students are being introduced to such units of measure as the centimeter, the liter, and the kilogram as early as the first grade and are experiencing very little difficulty using such units in their work. A typical scope and sequence chart for the development of mathematics in the elementary schools shows that metric measurement is introduced and developed at every grade level from grade 1 through grade 8.

Instruction in the use of the metric system is actually far easier than with our customary units of measure. The metric system is logical, and its decimal basis conforms to our numeration and monetary systems. When introduced to it in our schools at an early age, youngsters find it to be a very natural extension of our system of counting and grouping by tens. A far more difficult problem appears to be that of obtaining general public acceptance of any system with which the public is unfamiliar, and massive efforts are needed for such public education.

The Metric Education Act of 1978 (PL 95--561), an amendment of the Elementary and Secondary Act of 1965, states that "Congress finds that ... a Federal program is vitally necessary if the American people are to adapt to the use of the metric system of weights and measures." This act has been folded into Chapter 2 of the Education Consolidation and Improvement Act of 1981 as part of the block grant.

The National Council of Teachers of Mathematics, Association of State Supervisors of Mathematics, and National Council of Supervisors of Mathematics are concerned about the operation and effectiveness of the Metric Education Program. Federal funds are being expended with little apparent progress toward the implementation of the metric system in the United States. Thus we urge that a widely representative task force be established that will include metric educators, United States Metric Board Education representative, and others concerned about the ineffective use of federal funds and the slow progress of metrics in the United States for the purpose of making recommendations that will increase the effectiveness of metric education programs at the state and local level. This position has recently been communicated to the President of the United States by Max A. Sobel, President, National Council of Teachers of Mathematics (copy attached).

The children entering kindergarten in 1982 will be young adults at the start of the twenty-first century. They will be ready by then, to accept a metric system of measurement. It is the sincere hope of the mathematical and scientific society in our country that we can be ready for them...and we can be if we proceed with a vigorous campaign to "think metric" during the 1980s. Certainly a country that could place a person on the moon with a decade of effort can change to a system of measurement that is currently being used by the entire civilized world.

Max A. Sobel
President

0009/2284

8 February 1982

NATIONAL COUNCIL OF
Teachers of Mathematics
NCTM
1906 Association Drive, Reston, Virginia 22091 ■ (703) 620-9840

FOR YOUR INFORMATION

1 February 1982

The President
The White House
Washington, D.C. 20500

My dear Mr. President:

Mathematics teachers are committed to the use of metric weights and measures. As a result, students routinely learn to use the metric system of measurement as a part of regular educational programs.

In order to support continued efforts to develop instructional strategies and educational materials for the most efficient learning of the metric system as allowed for in Subchapter C, Special Projects, of the Education Consolidation and Improvement Act of 1981, we are requesting a review of the implementation of the Metric Education Act of 1978 (PL 95-561). Such a review would be most beneficial to states establishing block grant allocation priorities.

Given the changes in the Department of Education and the United States Metric Board prompted by the current reorganization, the results of such a review could provide students, teachers, parents, and the general public with the knowledge that previous metric education efforts were not in vain.

I look forward to being able to share your response with mathematics teachers and other individuals and organizations interested in the improvement of mathematics instruction at all levels.

Sincerely,

Max A. Sobel
President

MAS/nr

cc: The Honorable Terrel H. Bell, Secretary of Education
The Honorable Malcolm Baldridge, Secretary of Commerce
Mr. Theodore S. Farfaglia, Executive Director, U. S. Metric Board

0009/2229

BOARD OF DIRECTORS

President
Max A. Sobel
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Statement Regarding Metric Education in the United States

to

the Subcommittee on Science Research and Technology

of

The United States House of Representatives

Presented

by

Helenmarie Hofman, Ph.D.

Assistant Director

Member Services

National Science Teachers Association

February 8, 1982

Mr. Chairman, I am Helenmarie Hofman, Ph.D. I am here today to represent myself and the National Science Teachers Association (NSTA) in making a statement regarding Metric Education in the United States. The National Science Teachers Association has extensive background and involvement in metric education. As part of the NSTA staff I have served in the capacity of Director and Associate Director on a variety of projects involving metric education.

The National Science Teachers Association was officially formed July 4, 1944. Its first item of business was the adoption of a resolution urging Congressional action for post-war adoption of the metric system of measurements. The association, through its Board of Directors, has issued numerous supportive resolutions favoring metric education and these were often communicated to the appropriate legislative committees. NSTA was one of the organizations invited by the United States Department of Commerce, National Bureau of Standards, to participate in their three year U.S. metric study to evaluate the impact of the metric education trend, and to consider alternatives for a national policy. NSTA established an ad hoc committee which prepared a report on the study of conversion to the metric system of measurements. This report described the status of the use of the metric system in science teaching at various grade levels, and the advantages and disadvantages of teaching and using the metric system, its possible future effects, and the problems and costs of conversion. NSTA also recommended at that time, 1970, a ten year conversion schedule for educators. In 1976, a metric position paper "Metric (SI) Education and Science Instruction in the Elementary Schools," 132 pages, was endorsed by the NSTA Board of Directors.

All NSTA publications, and its journals, Science and Children, The Science Teacher, Journal of College Science Teaching, incorporate and encourage the use of metric terminology. Special publications available from the association over the last 15 years have dealt with the use and application of metric measurement. NSTA has continued to participate in numerous metric conferences and study committees, to present sessions at its National and area conventions, and to publish articles on teaching and applying the metric system in the classroom and the laboratory. Two of the most recent major projects which incorporate the International System of Units-SI are the NSTA's Project for an Energy-Enriched Curriculum, funded by the U.S. Department of Energy, the largest curriculum development project in energy education, which includes over 40 units written in metric on various energy concepts; and a 1981-82 International Systems of Units Materials Development and Dissemination Project, funded by the U.S. Department of Education, Metric Education Program. The Metric Materials Project consists of a series of six specifically focused posters dealing with related derived units in the SI system. The materials are aimed at secondary school science students and teachers.

It has become apparent to the National Science Teachers Association and others, as evidenced in their statements to the committee today, that informal and formal education in the area of metrics is essential to the public acceptance of the metric system. The association will continue its efforts in this area as supported by the following 1969 position statement:

Conversion to the Metric System

The National Science Teachers Association applauds the authorization by Congress in July 1968 of a study of the advantages and disadvantages of converting to the metric system. We recognize the need for an objective evaluation of all aspects of the conversion process and for sound guidance and implementing those changes essential for a more extensive use of the metric system in the United States.

The efficiency and effectiveness of the metric system have long been evident to the scientists and educators. The desirability of a worldwide, uniform system of measurement is obvious; approximately 90 percent of the earth's population resides in nations committed to the metric system. For the United States, conversion appears necessary and inevitable. The association, therefore, strongly urges that the metric system and its language be incorporated as an integral part of the education of children at all levels of their schooling.

In summary, the National Science Teachers Association's expertise in furthering metric education allows us to look forward to involvement in any federally established task force, commission, or any other such group which would address plans for metric education and its implementation in the United States.

Mr. Chairman, thank you for the opportunity to provide this committee with information about the National Science Teachers Association's background in metric education.

THE NATIONAL FOUNDATION FOR THE IMPROVEMENT OF EDUCATION
A Non-Profit Tax Exempt Foundation Created by the NATIONAL EDUCATION ASSOCIATION

February 8, 1982

The Honorable Don Fuqua, Chairman
Committee on Science and Technology
The United States House of Representatives
Rayburn Building, Rm. 2318
Washington, D.C.

Mr. Chairman:

The National Foundation for the Improvement of Education (NFIE) is pleased to provide testimony on metric education to the Committee on Science and Technology of the United States House of Representatives. The NFIE will present its perspective on the importance of metric education in the schools of the nation, the need on which its effort is based, the nature of the educational project for which it has received a grant from the Metric Education Program of the United States Department of Education, and the objectives and expected results of that educational project.

First, for clarification, the National Foundation for the Improvement of Education (NFIE) needs an introduction. It is a 501(c)(3) tax exempt, nonprofit educational and charitable institution created by the National Education Association (NEA) in 1969. Its mission as stated in its charter is "to improve the quality of education available to citizens of the United States and other countries." By requirements of its charter and IRS regulations, its efforts are entirely educational with no lobbying or other political activity. In its twelve-year history it has conducted more than 40 educational projects with over $7 million in grants and contracts from foundations, government agencies, corporations, and individuals. Funding for current projects exceeds $1 million. The history of NFIE projects has ranged through various levels of formal research and problem solving, curriculum development, building knowledge bases, and designing and conducting education and training workshops for various educational needs identified by teachers, parents, and others. It works in response to educational needs identified by its own Board of Directors, its staff, educators, and other organizations and individuals. Its four priority areas of concentration to fulfill its mission are educationally underserved populations, teaching-learning environments, education and technology, and innovations in curriculum and instructional processes.

The project now funded with a grant from the Metric Education Program clearly falls within its mission, its areas of concentration, and educational need perceived by teachers.

While the current legislation and regulations regarding metric education require its institution as voluntary, the National Education Association (NEA) has taken a strong position about the need to institute metric education. The Representative Assembly, which is the governing body of the NEA, has passed and reaffirmed a resolution on "Conversion to the Metric System":

> "The National Education Association believes that a carefully planned effort to convert to the International System of Units (SI metric system) is essential to the future of American industrial and technological development and to the evolution of effective world communication. It will work with the National Metric Board created by the Metric Act of 1975 to facilitate such a conversion.
>
> "The Association urges that the SI metric system of weights and measures be taught at the appropriate educational levels to assure the orderly transition to the use of the SI metric system as a primary system."

Whether the present voluntary approach remains or new legislation makes adoption of the metric system mandatory, the fact remains that education of children and adults in metrics is a major need. Without it, citizens of the United States become increasingly unable to deal with measures, for more and more of them are being presented in metric.

In 1980 the NEA conducted a Nationwide Teacher Opinion Poll to a random sample of 2,200 teachers throughout the United States. Several items on metric education were included. The results of the survey show that teachers in large numbers across the country support the need for metric instruction both for themselves and for their students. The teachers' responses to the metric items on the survey were as follows:

- Most students are able to use the metric system of measurement. (80 percent of the teachers surveyed DISAGREED.)
- Teachers are sufficiently prepared to teach the metric system. (80 percent DISAGREED.)
- Schools are doing all they can to prepare students. (75 percent DISAGREED.)
- Schools provide sufficient instructional materials. (72 percent DISAGREED.)
- All instruction on the metric system should be in science and math classes. (71 percent DISAGREED.)
- The school system should provide teachers more inservice education on metric. (78 percent AGREED.)

As teachers are strongly urging not only the need for the teaching of metrics and the need for sufficient, high quality instructional materials in areas that go beyond science and math classes, they urge effective inservice education on metrics. As they urge this inservice, they also express their own perceived need to become more professionally competent as new educational components enter the schools.

Recognizing the teachers' perceived needs, NFIE surveyed existing metric education materials in the substantial library of such materials at the National Council of Teachers of Mathematics. These materials are of various types: commercial, nonprofit, giveaways, and advertising products of industry. The survey of these materials revealed major problems: (1)

Most lack technical accuracy and consistency. (2) They are frequently formatted in a manner that is not clearly conducive to learning about metrics, especially the interrelationships of different metric measures. (3) They are of poor quality. (4) Those in filmstrip form are approximately twice as expensive as the materials NFIE could develop. (5) They have not been created from the perspective of learner and teacher needs, but for the most part from the perceived needs of the producers.

NFIE determined that new materials of high quality meeting the needs both of learners and of teachers should be created and disseminated nationwide. To meet those needs, NFIE proposed to field test materials it developed in classrooms chosen for demographic and grade distribution. Learner needs must be assessed in relation to underserved groups, including cultural and ethnic minorities, handicapped, and women -- each of whom may bring different factors to bear on the materials. For example, it needs to be known whether the materials are culture free or whether they work better with one cultural group than another.

Still another kind of assessment of learner needs which must be addressed is the age level of the students in relation to the appropriateness of the materials. NFIE proposed to develop materials which are as age and grade free as possible, appropriate for various educational levels. The reason for this decision is that students begin study of the metric system at a variety of different ages because there is not a legislated mandate for metric education. If a school system offers metric education, it may begin in elementary school in the second or the third grade. NFIE's materials must be appropriate for that level. On the other hand, many high school students have had no introduction to the metric system. The materials should be appropriate for them also and not seem limited to elementary age interest.

In addition, the teachers' identified need for the quality materials for classroom instruction and their need for quality inservice to enable them to teach it further influenced NFIE's approach. They need the inservice materials to assist them in learning the metric system and then in communicating it effectively to students so that mastery learning can be accomplished. Teacher involvement in development of those materials as well as of the inservice component is essential to meet their perceived need for their students and themselves.

With this background assessment of needs and analysis of effective approach, NFIE applied for and received a grant in the amount of $63,000 to develop and produce a self-contained basic curriculum, with an accompanying inservice component, in five areas of metric measurement -- linear, area, volume, capacity, and mass (weight). The materials would provide teachers with a way to teach metrics effectively through the inservice component of the package. And the materials would provide students at a wide range of grade levels a way to master five areas of metric. The unique approach to instructional design would be to show the interrelationships of the different metric units.

The project has been designed to meet the validity and reliability standards set by the Joint Dissemination and Review Panel, for potential entry into the National Diffusion Network (NDN). In addition, upon completion of the development phase, the widest possible dissemination can be undertaken of teacher tested and learner verified materials through the massive 1.7 million member NEA network and through the networks of other organizations and agencies. The NEA network, organized into 12,500 local and 53 state affiliates, enables potential dissemination to all 86,000 public elementary and secondary schools serving 41 million students throughout the nation.

As a one-year development project begun in June, 1981, the grant is not yet completed. The draft materials are currently being reviewed for technical accuracy and consistency by a panel of nationally recognized experts in metric, and for instructional design by a panel of elementary and secondary classroom teachers. The draft materials in workprint stage for filmstrips, audiotapes, and supplementary print materials will be ready for field testing within 30 days. Final revisions and mastering will be accomplished by the end of May, 1981. Because the project is still in process, NFIE cannot comment on the success of the educational effort, except to say that the materials are being designed in a process and with an assessment of need that projects every possibility of success in meeting those needs with quality materials with greatest instructional effectiveness.

Certainly, the effort of NFIE in this area is not alone, and a variety of programs is needed to meet the need. NFIE is proud to be part of this educational effort to make students and teachers literate in the metric system which is ever increasing in the fabric of their daily lives.

Respectfully submitted,

Samuel H. McMillan, Jr.

Samuel H. McMillan, Jr.
Associate Executive Director

BIOGRAPHICAL SKETCH

Dr. Samuel H. McMillan, Jr., Associate Executive Director of the National Foundation for the Improvement of Education (NFIE), Washington, D.C., shares responsibility for the management and administration of the Foundation's new project development and fundraising, of its day-to-day operation, and or its grants and contracts averaging $1 million annually. He has been principal investigator or corporate monitor for numerous NFIE projects from 1976 to the present.

He was project director for Project Life (1977-1980), originally funded by the Office of Education, U. S. Department of Health, Education, and Welfare, in which he managed both the development and the dissemination of reading and math readiness materials for handicapped children, at first for the deaf and later for the multiple handicapped. He was principal investigator for a research study evaluating The University of Texas' Competency-Based High School Diploma for CETA Clients, funded by the U. S. Department of Labor. He was corporate monitor for the development and field testing of a teacher-designed inservice training manual for teachers mainstreaming handicapped students, funded by the U. S. Department of Education. He was Senior Research and Policy Analyst for the Education Law and Policy File Study, funded by the National Institute of Education.

He is currently representing NFIE in several ongoing projects. He shares responsibility for the promotion and dissemination of Mexico As Seen By Her Children, a supplementary text and instructional kit about Mexican life and culture, consisting of art and writing by Mexican children. He previously served as corporate monitor for the development and field testing of that instructional kit, funded by the U. S. Department of Education. He is consulting on curriculum and script development for the ABC/NEA SCHOOLDISC Program, a supplementary educational program on interactive videodisc. And he is corporate monitor for the current Metric Education curriculum project funded by the U. S. Department of Education.

Formerly Dr. McMillan was Associate Professor of English and Associate Director of the Interdepartmental Black Studies Program at The University of Tennessee, Knoxville. There he also served as Director of the Writing Laboratory and Director of Folk and Ethnic Studies. Within the Department of English he was Director of the Black Literature unit.

Dr. McMillan holds the Ph.D. in English from The University of Texas at Austin and a postdoctorate in Black Studies from Yale University, where he was a Danforth Fellow. He holds the B.A. from Southern Methodist University, with Honors and with Departmental Distinction in English. He is a member of Phi Beta Kappa.

APPENDIX III

STATEMENTS FOR THE RECORD SUBMITTED BY INDIVIDUALS

Dr. Piyush C. Agrawal
Dade County Public Schools
Miami, Florida

It is my distinguished privilege to share with you, Mr. Chairman, and the members of the Committee on Science and Technology, some of the issues related to the area of metric education.

My name is Piyush Agrawal, and currently I am working with the Dade County Public Schools, the fourth largest school system in the country, as mathematics supervisor responsible for K-12-Adult programs. Before that I worked for UNESCO, a specialized agency of the United Nations, for a number of years as an expert in mathematics education in different countries.

The issues I intend to bring to you attention, this morning, are from the perspective of an educator, who believes that our system of education must provide each child opportunities to develop the fundamental skills essential for survival in the society of today as well as of tomorrow. Our educational system can not afford to deny our children access to the skills that will enhance their ability to deal successfully with growing international cooperation in the fields of trade, technology, human relationship, and educational understanding. Clearly, some progress has been made to offer metric education, however, that progress is not enough.

In the absence of a definite time frame for conversion to the metric system, American schools are obligated to burden our youth with the study of two different systems of measurement. This burden wastes our limited financial resources and imposes needless instructional hurdles. The use of customary system of measurement has conventionally required an overemphasis on the study of fractions. The use of metric system will significantly reduce the time currently spent on fractions. Thus the time saved, by reducing the emphasis on fractions and by eliminating the customary system of measurement, can be gainfully utilized to improve the overall quality of mathematics and science instruction. Our lack of commitment to strengthen America's instructional programs in Science and Mathematics ultimately may result in loosing our technological supremacy.

This is the right time, Mr. Chairman, for the Committee on Science and Technology and the Congress to commit itself to metricate the nation. The issue at hand, in my opinion, does not center on making a choice between the customary system and the metric system, but rests on the issue of how soon the use of metric system can be mandated. The longer we wait, the more we lose. The nation has already invested much time and money. A further modest investment with a clear commitment will not only salvage our past investments but will provide much needed additional time for qualitative improvement in school instruction. From my experience of directing metric education programs in two states, New York and Florida, during the last five years, I have found that administrators, supervisors, teachers, and students, after being exposed to the metric system, have a very positive attitude towards learning it.

I understand that through the provisions of the Education Consolidation and Improvement Act of 1981, the responsibility of metric education is being transferred to the states. In such a case, it seems very possible that, some states may run highly effective programs while others may choose to ignore metrication completely. This situation may exacerbate the determination of a national policy on this subject. It seems, at times, incomprehensible to me that a technologically advanced society like ours would drag its feet on a small but significant issue like metrication. Mr. Chairman, I urge this committee and the Congress to take appropriate actions in the direction of developing an effective and cohesive national metrication policy.

Again, thank you, Mr. Chairman, for the opportunity to let me share my professional metric educational experiences and views before this committee.

Dr. Piyush C. Agrawal
9375 S.W. 170th Lane
Miami, Florida 33157

EDUCATION

Ed.D	University at Albany (SUNY), New York, 1979
Ed.S	University at Albany (SUNY), New York, 1978
M.S.	University at Albany (SUNY), New York, 1972
M.Sc.	Agra University, Agra, India, 1963
B.Ed.	Delhi University, Delhi, India, 1958
B.Sc.	Agra University, Agra, India, 1955

PROFESSIONAL EXPERIENCES

1979 Supervisor for Mathematics Programs: Dade County Public Schools, Miami, Florida

Responsible for systemwide administration and coordination of all mathematics programs K-12-Adult for the fourth largest school system in the country, currently serving 240 000 students in the regular K-12 program and 170 000 in the Adult Education program. Some major responsibilities include, but are not limited to, monitoring programs (including ESEA, Title I, Compensatory Education, Metric Education, and ESEA); supervising administrators, educational specialists and support staff assigned to the Supervisor's Office.

1977-79 Director: Metric Education Projects, Regional Planning Center, Albany, New York

Coordinated and implemented the metric education programs for 98 school districts in New York State; designed and developed the "Symbiotic Multiplier Model" to provide inservice for 3,000 administrators, supervisors, and teachers.

1971-76 UNESCO EXPERT: United Nations Educational Scientific and Cultural Organization (UNESCO), Paris. Assignment: Liberia.

Advised the Ministry of Education, Liberia on the development of mathematics curriculum and the teacher education programs; prepared documents and budget proposals for the UNDP-UNESCO technical assistance to Liberia; identified and developed suitable projects for inclusion in the Request by the Ministry of Education to the World Bank for Second Education Loan; organized and presided over a discussion meeting of more than 20 UNESCO EXPERTS in Liberia to examine the First Draft of the National Long-Range Education Plan 1975-85.

1968-70 UNESCO EXPERT: United National Educational Scientific and Cultural Organization (UNESCO), Paris. Assignment: Tanzania.

Advised the Government of Zanzibar, Tanzania on the development of a suitable education plan. Taught mathematics at the Technical College.

1958-68 Teacher, Department Head (Mathematics, Physics, Chemistry) Delhi Administration, Delhi.

Taught mathematics, physics, chemistry, and general science. Organized the Modern Mathematics Study Circle to provide a forum for university and secondary school mathematics teachers. Advised the National Council of Educational Research and Training on the development of mathematics curriculum.

PUBLICATIONS

More than 2 dozen publications including six on Metric Education.

TESTIMONY FOR

HOUSE SCIENCE AND TECHNOLOGY COMMITTEE

METRIC OVERSIGHT HEARING

Submitted by: Dr. Barbara Berman
Dr. Fredda J. Friederwitzer
Co-Directors
Educational Support Systems, Inc.
446 Travis Avenue
Staten Island, New York 10314
(212) 698-3636

We are pleased to have this opportunity to share our experiences in metric education with this Committee. Our involvement with the federal metric education program dates back to 1976. We have been Coordinators and/or Directors of federally funded projects at Rutgers University, New Brunswick, New Jersey (4 years) and Educational Improvement Center/Northeast, West Orange, New Jersey (1 year). Currently we are Co-Directors of two programs: Project STAMP for Educational Support Systems, Inc., Staten Island, New York and Project TIME at the Educational Improvement Center/Northeast.

During these past six years, we have worked directly with teachers, supervisors, parents and community residents and, indirectly, with children. Our objectives have been to develop an understanding of the metric system in all elements of the population. For teachers specifically, our efforts have been most intensive. Our programs have included instruction in teaching strategies as well as content to enable teachers to successfully develop metric understanding with their own students. Furthermore, a great many of these teachers have gone on to become workshop leaders in their own right and have instructed colleagues in the metric system. These colleagues were then able to teach their own students.

In order to disseminate metric information to educators as well as the general public, we have published a metric newsletter for five of the six years. (The two most recent issues are included in this report.)

To increase the cost effectiveness of our funded projects, we have employed a strategy known as the multiplier approach. This strategy involves long-term training of a cadre of educational personnel who then serve as staff developers (i.e., multipliers) for their schools and/or districts. We have worked directly with more than 400 educators across the country. Through them, our program has reached thousands of teachers and tens-of-thousands of children. The success of these efforts has been statistically evaluated and documented in reports to the Department of Education Metric Education Program.

For example, during the four years in which the Rutgers Metric Program operated, all participating teachers, at all grade levels, showed significant growth in metric knowledge. This includes the teachers taught directly by us as well as those taught by the multipliers. The students of these teachers also showed significant growth in metric knowledge. Furthermore, a study conducted during one program year showed that teachers retained their knowledge of metrics over the long term and continued to teach it to their students.

In addition to the long-term staff development programs referred to above, we have worked directly with approximately 1000 teachers on a short-term basis. Our activities provided these teachers with a knowledge of the metric system and the techniques for teaching it to their students. Because of this training, tens-of-thousands of children learn the system.

Although our primary efforts have been devoted to staff development and the preparation and implementation of metric curriculum for teachers, we have also focused on developing curriculum for children. Under our direction, teachers trained in our programs developed a

Curriculum Guide for integrating metrics into all elementary subject areas. This Guide has been used by many school districts since 1978. A sequential activity program for elementary children (grades 1-6), which we developed, was published in 1978 and has been widely disseminated. We are currently developing a similar program for junior and senior high school students.

As part of our work in Project TIME this year, we are preparing student activity packets to accompany a travelling metric exhibit which we designed, This exhibit will be circulated to elementary school classrooms in New Jersey by The Newark Museum and the New Jersey State Museum in Trenton.

The DE Metric Education Program, during its six years of operation, has funded more than 200 projects. These projects developed many exemplary curriculum materials. As part of our current Project STAMP activities, we are attempting to collect information about these varied materials, catalog them, and publish an Annotated Bibliography. This publication will be made available to school districts across the country, allowing them to draw upon already-developed, field-tested resources for their metric education efforts.

In summary, we feel that the federal funds allotted to programs with which we have worked were successfully used in a cost-effective manner. As a result of our efforts, thousands of educators and students have learned to use the metric system. Thousands more have utilized the curriculum materials we developed which are still available for future use.

We, as educators, bear the responsibility of preparing students for life in the 21st century, as well as in the present. We must equip our children to function successfully in an interdependent, technological world which has already adopted the metric system of measurement. An understanding of metrics and the ability to use the system should become an integral part of our children's lives now, so that the United States does not fall behind the rest of the world technologically or commercially.

Again, let us express our gratitude for this opportunity to report on our experiences in the Metric Education Program. We are available for questioning if the need arises.

OVERVIEW OF PROJECT STAMP

May, 1981 - May 1982

Project STAMP is an already field-tested program that operated successfully for four years in New Jersey. This staff development model was designed in light of recent knowledge of cognitive psychology, instructional methods for teaching mathematics, and characteristics of effective inservice programs. The curriculum procedures and materials used during the training workshops were developed after study of Piagetian theories on how individuals gain and retain knowledge. Findings on teaching/learning styles and time on task were incorporated as well. Because measurement is a subset of mathematics, careful consideration was also given to the research of mathematics educators on the most appropriate model of instruction for teaching new mathematical ideas.

The inservice program employs the multiplier strategy to disseminate project activities to large numbers of elementary school teachers and students. This approach involves training selected resource personnel in each school building to become inservice workshop leaders for their colleagues, thus multiplying the benefits of the original workshop experience. All trained teachers then implement a metric program within their own classrooms with students.

The workshop format utilizes a concrete, problem-solving approach to provide 25 hours of inservice training. Sequential, in-depth instruction in metric measurement concepts is combined with appropriate methodology for teaching metrics to adults and children. As an integral part of the metric curriculum, mathematical concepts of place value, decimals, area, volume and graphing are emphasized. Participants will be involved in hands-on activities which are immediately applicable to classroom use with children, thus creating a model for the teachers to teach as they were taught.

Specifically, Project STAMP will provide four full days of metric inservice and a complete set of training materials to each participating district. These materials will include a "Starter Kit" of basic metric equipment, as well as instructional materials for teachers and students. To facilitate the implementation of the project within each district, consultants will be available for on-site assistance. There will be no costs to participating districts other than those incurred by district resource personnel (teachers, supervisors and/or principals) for attending the training workshops.

For further information contact:

Dr. Barbara Berman/Dr. Fredda J. Friederwitzer
Educational Support Systems, Inc.
1023 Willowbrook Road
Staten Island, New York 10314

Overview

Project TIME

August, 1981 - July 1982

Project TIME (Teacher Inservice Through Museum Education in Metrics) was developed to meet the educational needs of the inner city residents of Newark, New Jersey through a non-traditional delivery system. It is a collaborative effort by three different community agencies (the Newark Museum; the Educational Improvement Center/NE, a regional educational center; and the Newark Board of Education) to provide staff development for Newark teachers as well as classroom instruction for Newark students in metrics.

The overall goal of the project is to develop the metric concepts and skills of teachers and children. To achieve this goal, the project, in conjunction with the Newark Museum, will conceptualize and fabricate mobile metric exhibits for use in Newark elementary school classrooms. The exhibits will then be circulated by the Museum's Lending Department as part of their regular Travelling Exhibit Program. The Mobile Metric Exhibits will be accompanied by a Multilingual Metric Activity Handbook, developed by Project Staff, to enable borrowers to make maximum use of the equipment and materials included.

To facilitate the use of the Exhibits in Newark Schools, Project Staff will conduct a staff development program in metrics for Newark teachers and for staff members of the Newark Museum. This inservice will consist of a series of activity-oriented, hands-on workshops using the equipment and materials contained in the kits, to develop metric concepts and skills. Museum staff trained by the project will, in turn, conduct workshops at the Museum for visiting classes. Teachers trained by the project will become resource persons in their schools, teaching metrics to their colleagues, thus multiplying the benefits of staff development program.

In addition four one-day metric mini-courses will be offered by the Project staff at EIC/NE for teachers and supervisors. These full day hands-on workshops present an overview of the metric system including linear measurement, liquid capacity, mass and temperature.

For further information contact:

Dr. Barbara Berman/Dr. Fredda J. Friederwitzer
EIC/NE
2 Babcock Place
West Orange, N.J. 07052

PROJECT STAMP
ESS, INC.
446 Travis Avenue
Staten Island, NY 10314

Metric Comments

In most cases, metric won't change a thing– except, maybe, your point of view.

If you're slightly overweight in pounds, you're going to be just as overweight in kilograms, but it will sound better.

You won't weigh more than you did before, you'll simply express it differently.

It won't take you any longer to get from one place to another than it did before. You'll simply state the distance in kilometres instead of miles. You won't drink any more or eat any more because the food and drink you're buying is sold in kilograms, grams and litres instead of pounds, ounces and quarts.

You see, Metric isn't here to change the world—just to make it a little more orderly. If 98% of the countries around the world are using the Metric System—there's got to be a reason for it.

You too can measure up

HAVE YOU WRITTEN TO YOUR LOCAL CONGRESSMAN AND SENATOR IN SUPPORT OF METRIC LEGISLATION?

IF YOU NEED HELP IN WRITING A LETTER OR WITH THE ADDRESSES OF YOUR CONGRESSMAN OR SENATORS, CONTACT
PROJECT STAMP HOT LINE
(212) 698-3636

METRIC COMMENTS

Volume I - No. 1 September 1981

Judith Binish Watson, Ph.D.
Editor

Barbara Berman, Ed.D.
Fredda J. Friederwitzer, Ed.D.
Directors, Project STAMP

Metric Comments is an official publication of the Educational Support Systems, Inc. (ESS) program Project STAMP, a DE Metric Education Program. It is produced under Grant #G008100188. Project STAMP is headquartered at 446 Travis Avenue, Staten Island, NY 10314, (212) 698-3636.

Project STAMP welcomes the sharing of viewpoints, opinions and items of metric interest. **Metric Comments** serves as a vehicle for the development of widespread metric awareness. Opinions expressed are not necessarily endorsed by the Staff of Project STAMP

OVERVIEW OF PROJECT STAMP

EDUCATIONAL SUPPORT SYSTEMS, INC. (ESS) has been funded by the Department of Education to conduct a national metric education project during the 1981-82 school year. The program, titled Project STAMP (Support and Teacher Training: Assistance for Metric Projects) has several components.

SUPPORT AND TEACHER TRAINING

- A long-term inservice program for teachers and supervisors in areas of the U.S. which have received little federal funding for metric education in the past five years.
- One day workshops for interested agencies.

ASSISTANCE FOR METRIC PROJECTS

- On-site program reinforcement by staff members or regional metric consultants.
- Telephone service for answering questions for specific metric information and advising.
- A metric newsletter.
- An ANNOTATED BIBLIOGRAPHY of products developed by former metric grantees.

METRIC DATE TO REMEMBER

On December 23, 1975, President Gerald Ford signed the Metric Conversion Act of 1975 which became Public Law 94-168. The law declared a national policy of coordinating the increasing use of the metric system in the United States, and established a 17-member U.S. Metric Board to assist the voluntary conversion to the metric system.

GREETINGS FROM THE DIRECTORS OF PROJECT STAMP

We are happy to have this opportunity to greet old acquaintances on the metric scene and to welcome new ones. During our years at Rutgers, with METRICCAP, we were in contact with educators across the country. As Directors of Project STAMP, we hope to continue and expand these relationships.

The coming year will be crucial for metric education. By now, you are all painfully aware of the massive cutbacks in federal funding. The Metric Education Program is particularly vulnerable as it is slated to become part of the block grants to the states. We must exert greater efforts to make our accomplishments visible to state and federal legislators, as well as to the general population, so that funding for metric education will continue. We must "spread the word" that the change to a metric America will benefit our country economically as well as educationally.

We look forward to hearing from you and meeting many of you in the coming year. Feel free to call or write with comments or questions.

Barbara and Fredda

Metrics makes sense - like $ and ¢

1.	100	10	1	$\frac{1}{10}$	$\frac{1}{100}$
$456.93	4	5	6	9	3
Dollar Name:	Hundred	Ten	One	Dime	Penny
Metric Name:	hm	dam	m	dm	cm

THE U.S. METRIC BOARD

What: an independent federal agency which represents consumers, labor, business (large and small), education, science, engineering, state and local government, and the public-at-large.

Why: the Board exists to coordinate conversion to the metric system created under the Metric conversion Act of 1975. The Board is mandated to:
1) devise and carry out a comprehensive program of planning and coordinating metric conversion;
2) conduct a program of public education at all levels of society to familiarize the American public with metric weights and measurement;
3) conduct research and submit recommendations to the Congress and the President;

Who: seventeen Board members were appointed by President Carter and confirmed by the Senate in 1978 to represent all sectors of society.

Where: contact USMB directly for info on meetings, public sessions and meeting locations. USMB, 1615 N. Lynn St., Arlington, VA 22209, (703) 235-2820.

GREETINGS FROM DR. FLOYD A. DAVIS

September 4, 1981

Dear Metric Educational Leader
and Colleague:

I am encouraged by the continued positive commitment to focus on the educational mission of developing and implementing viable metric educational programs.

The essence of the Metric Education Program is its projects and the things that they cause to happen. These events have been based on sound educational planning and will apparently have an enduring impact. Since Fiscal Year 1976, hundreds of thousands of educators, other beneficiaries, and students at all levels and from many areas of professional and academic pursuit, have benefited from metric educational experiences supported by these awards.

Educators are the facilitators and turn-keys for our national metric pursuits. They have done and are doing a great job. I appreciate the opportunity to commend them for a job well done: providing leadership in response to the demonstrated educational need for metric education.

I encourage interest in metric pursuits by former grantees and by the general educational community. As always, contact me if I may be of assistance. Keep up the good work!

Sincerely,

Floyd A. Davis, Ed.D.
Director
Metric Education Program
202-426-7220

METRIC EVENTS

The United States Department of Education
Sep. 21-25, 1981, Miami Beach, FL
Annual National Metric Education Conference

U.S. Metric Association
Oct. 2-3, 1981, Denver, CO
Annual Conference

U.S. Metric Board
Oct. 16-17, 1981, Columbus, OH
Dec. 11-12, 1981, New Orleans
Bimonthly meetings

KEEPING UP WITH THE METRIC TIMES

The Defense Department plans to replace its .45 caliber pistols with metric caliber weapons over a ten year period beginning January, 1982. According to the General Accounting Office, the Pentagon will be buying 250,000 to 300,000 guns at cost of roughly $100 million.

According to Brig. Gen. Howard C. Whittaker, Deputy Commander of the U.S. Army Armament Research and Development, the Armed Forces are now short 52,000 handguns. He contends it is better to replace them with metric weapons than to buy out-of-date models. He further contends that "the lethality of 9 mm is better than .45 caliber in the destruction of both simulated and living tissue as reported in testing analysis" (The New York Times, Sunday, Aug. 16, 1981).

Where does this place the U.S. in "keeping up with the metric times?" Only one U.S. Company is expected to compete for these sales, against three major European manufacturers!

ANNUAL NATIONAL METRIC EDUCATION CONFERENCE

The United States Department of Education's **Annual National Metric Education Conference** will be convened at the Miami Beach Deauville Hotel. It is scheduled for the week of September 21-25, 1981. The conference agenda will provide for general sessions, workshops, and seminars. There will be national and international participation. It will include ambassadorial representation from metric converting or converted countries, national professional and technical associations, State weights and measurement officers, current metric project directors, representatives from major United States industries, State Metric Contact Persons, consumer interest group representation, and input from Federal and State government officials and Boards.

PUT THIS UNDER YOUR HAT AND THINK ABOUT IT

This conference will be a most significant one, for if the proposed Elementary/Secondary Consolidation (Block Grant) legislation is approved, it is scheduled to become effective beginning the Fiscal Year 1982. The September Conference would, therefore, be the last under current legislation. Funds for the Metric Education Program and several other programs comparable to it will be consolidated and awarded to the States and, in other instances, to local educational agencies for administration.

The Rhode Island Dept. of Education and Project STAMP will be offering a one-day metric workshop. Watch for further notices. (Senator Pell, D-RI is a staunch supporter of metrics.)

SOFT AND HARD CONVERSION

ANMC's Metric Practice Advisory Group, chaired by Samuel W. Rein, has issued the following definition of "soft conversion" and "hard conversion."

The terms "soft conversion" and 'hard conversion" pertain to a change from non-metric to metric measurement units. These terms are widely used and have been given a variety of definitions and interpretations. As part of its continuing efforts to foster uniform metric practice, the ANMC Metric Practice Advisory Group recommends the following definitions:

Soft conversion is the translation of magnitudes expressed in non-metric units of measure to their direct metric equivalents. This is accomplished by multiplying the non-metric magnitude by the relevant conversion factor. This conversion will need to be rounded to the number of significant digits that will signify approximately the intended precision of the original data.
For example:
11.4 ft. x 0.3048 m/ft = 3.474 72 m which is rounded to 3.47

Soft conversion does not effect the physical attributes involved. Lengths, volumes, etc., are not changed; only the measurement units for describing the lengths, volumes, etc., are changed. For example, soft conversion for a product sold in 1-lb, 5-lb, and 10-lb packages would mean that the packages would contain the same amounts but would be redesignated as 0.453 kg, 2.26 kg, and 4.53 kg. An example of soft conversion of the test conditions in a specification might be the redesignation of a test temperature from 100°F to 37.8°C.

Hard Conversion is a change from magnitudes expressed in non-metric units of measure to somewhat different magnitudes expressed in convenient metric units. For example, changing a standard packaging practice from 1-lb, 5-lb, and 10-lb sizes to 0.5 kg, 2.5-kg, and 5-kg sizes would be hard conversion. Similarly, specifying a test temperature at 40°C instead of 100°F would be hard conversion.

Dual labeling is the expression of magnitudes in both metric and non-metric units. It may be used in both soft and hard conversion. If dual labeling is used in hard conversion, metric values are usually placed first, and non-metric values, calculated by using the relevant conversion factor and rounding appropriately, are shown second in parentheses.

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INTRODUCING

Millie Prinzivalli, Office Manager of ESS, Project STAMP. It's Millie's voice you will hear when you dial (212) 698-3636.

THE METRIC WORLD

Did You Know?

Originally, the meter (standard unit of length) was equal to one ten-millionth of the distance from the North Pole to the Equator measured along the meridian which passes through Paris. In 1960, the meter was redefined in a laboratory setting as 1 650 763.73 wave-lengths of the orange-red line of the Krypton-86 spectrum. The gram is the weight (mass) of 1 cubic centimeter of water at 4°Celsius. The liter is the amount of liquid that could fill a decimeter cube.

The international English language spellings of **metre** and **litre** are also spelled **meter** and **liter** in the United States. All other English-speaking nations officially use **metre** and **litre**. These forms of spelling have been adopted by many companies, government agencies, schools, and professional organizations in the United States.

Since 1958, the metric system has become the dominant language of measurement in the world. There are currently 98 nations which use the metric system, and 45 which are in the process of adopting it. These nations contain 99.8% of the world's population. The only nations which remain without metric conversion policies are Brunei, Burma and South Yemen (U.S. Metric Board 1979 Annual Report).

According to a recent survey commissioned by the U.S. Metric Board, a random sample of **FORTUNE** magazine's top 1000 industrial firms assessed the status of metric conversions in terms of metric products and the extent of corporate metric planning and coordinated activities. It noted that 6% of the sales by the nation's top industrial firms are from products that are made to metric dimensions (Summation, 1981).

Apart from the pharmaceutical industry which has used the metric system for years, the automotive industry - mainly General Motors (GM) - currently leads the way. This corporation's target date for predominantly metric passenger cars is 1982. Moreover, GM has found that conversion is not as expensive as it had anticipated. In 1977, it estimated that its cost would be 3 or 4% of the original 1966 estimates. In late 1979, GM officials stated that the corporation's total cost for converting to the metric system was less than 1% of the original estimate (U.S. Metric Board, 1979 Annual Report).

The National Park Service, in an effort to help people become acquainted with the metric system and have it become meaningful, has introduced metric measurement in its maps and publications. Customary values follow the metric units in parentheses.

THINK METRIC

The American Home Economics Association says: Cook by volume, not weight.

PROJECT STAMP
ESS, INC.
446 Travis Avenue
Staten Island, NY 10314

Metric Comments

National Metric Week
May 10-15, 1982

METRIC NURSERY RHYMES

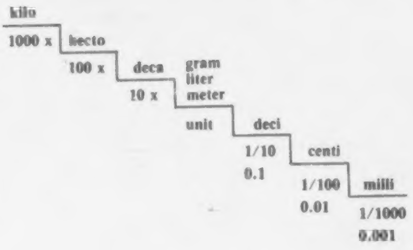
Jack and Jill
Went up the hill
With a water pail between them;
Carried ten full liters
A thousand meters!
Since then no one has seen them.

Polly, put the kettle on
And make us all some tea;
It tastes sweeter
By the liter
So save a lot for me!

Pat-a-cake, pat-a-cake, baker's man.
Bake me a kilogram cake if you can;
Ice it with chocolate and mark with SI
To help me learn metrics - I will really try!

Most things that come in liters pour, splash and spill.

STAIRCASE OF METRIC TERMS



METRIC COMMENTS

Volume I - No. 2 January 1982

Judith Binish Watson, Ph.D.
Editor

Barbara Berman, Ed.D.
Fredda J. Friederwitzer, Ed.D.
Directors, Project STAMP

Metric Comments is an official publication of the Educational Support Systems, Inc. (ESS) Project STAMP, a DE Metric Education Program. It is produced under Grant #G008100188. Project STAMP is headquartered at 446 Travis Avenue, Staten Island, NY 10314, (212) 698-3636.

Project STAMP welcomes the sharing of viewpoints, opinions and items of metric interest. **Metric Comments** serves as a vehicle for the development of widespread metric awareness. Opinions expressed are not necessarily endorsed by the Staff of Project STAMP

The material contained in this product, while funded by the federal government, does not necessarily reflect the views of the Department of Education.

Goodness knows, the purpose of the Metric System is to simplify, not to complicate your life!

EDITOR'S MESSAGE

It is a privilege and honor for me to be editor of METRIC COMMENTS. For several years, I have been involved in training teachers, supervisors, administrators, children, parents and other adults in the use of metrics. Over these years I have had the pleasure of exchanging ideas with others who have likewise dedicated themselves to metrics. It has been and still continues to be an exciting experience.

Participants at the Annual Metric Education Conference (9/81) at Miami Beach, Florida were enchanted when Phillip Althen of the Alcoa Aluminum Co. addressed the audience. Since many of you requested a copy of his remarks, I decided to include a portion of them in this issue of the newsletter. Enjoy!

I would like to take this opportunity to encourage each and every one of you to be in touch with us, whether it be gifting us with new ideas, thoughts or feelings about metrics, or whether it be a request for assistance to you in some way.

If you would like to have something included in the next issue of the newsletter, send it.

It is a great feeling to see how many people are excited about helping metrics grow.

The Editor

UPDATE ON PROJECT STAMP

Consultants have done metric workshops in various places in the past few months. Four-day workshops were given to teachers, supervisors, and administrators in New England and New Mexico. A one-day workshop was given in New York State as well as at the Arkansas project. Scheduling is presently going on for Puerto Rico and the Virgin Islands, Idaho and Los Angeles. Many other requests were received from states such as Nevada, Kentucky, Kansas and Hawaii. Metrics is gaining momentum!

An ANNOTATED BIBLIOGRAPHY of products developed by former metric grantees is being prepared for inclusion in the ERIC system. If anyone, other than a grantee, is interested in submitting anything, kindly contact us for information.

(212) 698-3636

FUTURE OF USMB QUESTIONED

The U.S. Metric Board (USMB) is an independent Federal agency charged with coordinating our country's voluntary conversion to the metric system. The Senate Appropriations Subcommittee chaired by Senator Lowell Weicker, Jr. (R-CT), has voted to cut the United States Metric Board's FY-1982 budget to $1.5 million, and to phase out the Board entirely by September 30, 1982. The Reagan administration has concurred with the subcommittee's recommendation.

The Senator feels that since the metric system has always been voluntary, eliminating the Metric Board will not affect the conversion process in the U.S.

Roger Travis, a member of the USMB, said, "The Board has been making substantial progress in coordinating a lot of federal government activities. If the Board is eliminated, the effects will be especially detrimental for consumers and small businesses."

The USMB's function could be turned over to the Commerce Department, which would administer national metric policy. The Office of Management and Budget (OMB) say the OMB does not know who will take over the functions of the USMB.

METRIC MAPS

The United States Geological Survey (USGS), the nation's principle civilian mapping agency, is making a new series of maps as part of a long-range plan by the USGS to gradually convert its topographic, geologic, water resources and other programs to the metric system. Contour intervals and elevations on the map are shown in meters instead of feet. The bar scale (the segmented line in the map margin used to measure distances on the map) shows feet and miles as well as meters and kilometers. These new maps will be used in land and resource planning by state and local governments as well as by private industry.

Most people would use their car to cover distances in kilometers and their feet to cover distances in meters.

Remarks by
Phillip C. Althen
Corporate Manager, Metric Conversion
Aluminum Company of America
before the
Annual National Metric Education Conference
Deauville Hotel, Miami Beach, Florida
1981 September 22

Since our subject is Metrics, I thought I'd start off with a number. Preferably a big number.

This one is from the National Geographic -- in an article on "Going Metric"

Each day in the United States, an estimated 20 billion measurements are made.

Twenty billion measurements, think of it. I wonder who measured that. It works out to roughly 100 measurements a day for each of us - - more like 120 a day for each adult. Sounds like a hard day's work.

Actually, the worst measurement of the day is probably the first one, signaled by that ghastly sound your alarm clock makes because you pre-set it for some ungodly but very precise hour of the morning. If you then stumble down to the kitchen, and put three or four tablespoons of coffee into a filter, that's measurement number two. And when you pour in the water, that makes three -- although the word "measurement" might be too dignified a description for what most of us are doing at that hour. I think my wife measures the water for coffee fairly well -- about a pint and three quarters. Me, I pour in about a half a peck....or whatever is in the teakettle...even if it's tea. Those who slosh a little milk into the coffee are making measurement number five. True, you don't meter it out -- but we're not talking about how well people measure things...just how often .

If you tend to head for the bathroom around 7 or 7:15, that's another measurement of time, and we're up to six. There, a woman might measure out a little shampoo or face cream or, let's say, cologne. The unit of measurement is called a dash --or a dab, or a splash. It's approximately equal in volume to a lick and a promise. For men, measurement number seven might be a squirt of aerosol shave cream onto the hand. Very approximate, but measured -- one dollop of shaving cream. The ads used to say it should be about the size of a golfball. In reality, it's never the same size twice -- but it's definitely larger than a chick pea, and it's smaller than a basketball. Close enough. There's no need to make precise measurements of shaving cream, only to smear it all over a very approximate face. Measurements number eight and nine are 2.5 shakes or squirts of after-shave and a worm of toothpaste.

Now -- we're nine measurements into the day. Notice that if this country had already gone completely metric...not one of those measurements would be the least bit different. Some measurements will be different. But by gosh, at least we'll be able to get dressed in the morning.

The great myth of metric conversion is the fear that it will somehow rob us of our beloved and familiar ways of doing things -- which it won't. This sense of foreboding should properly be called Metriphobia -- fear of metrics. Like other phobias, it has little substance, but of course it does have some. All phobias do. That's why we don't try to cure acrophobia by telling someone that fear of heights is hogwash ...and then urge him to step off a skyscraper. There are some things to get used to in converting to metrics -- and some of them will be a little troublesome -- but the potential difficulties and the potential costs are often blown way out of proportion.

Most of us have managed to adjust to 35 millimetre cameras, the 100-metre dash, the 400-metre freestyle, the 15 kilometre cross country, and 500-milligram vitamin pills. We may bridle a little at the 750-millilitre bottle of booze, but better to change the measurement than change the proof. The Chevette was designed in metric measurements, as are most foreign cars -- and the typical American is not seized with fear and loathing at the idea of owning a Mercedes, a Citation, Phoenix or Skylark. No, the actual changes tend to be fairly easy. But the anticipated changes -- ay, there's the rub: That undiscovered country where the dark symptoms of Metriphobia erupt.

One of the most conspicuous outbreaks of this phobia arose in Chicago and has since proved contagious. It's an organization called WAM, which stands for "We ain't metric." WAM was formed -- and I quote -- "to combat the horrible metric system that evil zealots are trying to force upon the rest of us decent, patriotic Americans." They compare metric conversion with prohibition. They talk about weathermen "selling out" to Celsius. They conjure up the horrors of having to say, "A miss is as good as 1.6 kilometres" -- or that someone is "All wool and 91.4 centemetres wide" -- or that "28.3 grams of prevention is worth 453.6 grams of cure." On a more cheerful note, Don McAdam took pen in hand and tongue in cheek for a Canadian Engineering Magazine to worry aloud about conversion to the metric chicken. Would it lay cubic eggs, he asks, or truncated cones?

I don't blame WAM for being upset. If metric conversion really meant what they think it means, even us "evil zealots" would be upset. They're afraid we'll have to master a whole new system of measurement -- which is a rather strange assumption, inasmuch as we never mastered the old system. Why would we suddenly have to become experts in the new one?

I never mastered the old system -- did you? And we seem to have gotten along all right...without knowing how many yards there are in a perch, which is the same as a rod...or how many rods make a furlong, which equals one rood. If you know how many furlongs there are in a mile, it's probably because you've been wagering on the ponies. In the third grade we had to memorize how many pints there are in a peck -- and that's about the last time any of us needed to know that. How many drams are there in a pound? And how many gills to the gallon.

Gills! A gill is a fourth of a pint, but who needs to know it? Drink a pint and you'll be sloshed to the gills -- that's all you have to remember. How far is a league -- as in seven league boots? I have no idea. If the Bureau of Standards were to adopt a standardized league, we wouldn't even be sure what to call it. The National League? The American League? However, those who need to know do know.

The point is, most of us get along nicely while ignoring most of the measurement system. We pay attention -- quite properly -- to those units that have some meaning in our lives. We learn those, and we use them consistently, so that we can communicate clearly and deal with others who use the same terms to mean the same things.

In that sense, measurement is a matter of language -- as it happens, a crucial matter of language. Linguists tell us there are close to a million words in the English language but that no single individual knows more than 100,000 of them. Well, 100,000 is enough; in fact, 10,000 is enough, as long as they are shared by the people you want to talk to. And here is the point of having an international system of measurement. The people we want to talk to are no longer clustered in the tidy confines of the United States.

Trade is international. Technology is international. Energy and raw materials -- whether we like it or not -- are international. American business is increasingly multinational, and the prime growth markets are developing outside the United States. Our nation needs more exports to balance its trade, and goods designed for export will be increasingly metric. Historically, systems of measurement first came into being to make possible the orderly conduct of trade. Today, that need is greater than ever -- and most multinational companies are moving ahead with metric conversion programs. They are finding, incidentally, that the cost impacts are relatively minor compared with some of the nightmare forecasts that were bandied about a few years ago.

In fact, the whole notion of cost has begun to take on a different perspective than it once did. This country -- by federal policy, by Act of Congress, and by the simple facts of life -- is committed to metric conversion on a voluntary timetable. A company or an organization moves into metrics when there is something to be gained by doing so -- gains in efficiency, in standarization and simplification of parts and components, and of course in adding strength to overseas marketing, or we move to metric because our customers are, or because we have to.

But if it's any consolation, a universal system requires universal discomforts. We're not switching to a French system or a European system. Both we and they are converting to a new system, The International System or Units "SI". SI is, of course, metric -- but it's a little different from any of the various metric systems in prior use. It is, in fact, the most efficient system of measurement that man has ever devised. The whole system is based on seven fundamental or "base" units and these units now have complete international agreement throughout the world.

Metric conversion in the United States is still a "low profile" issue. The Metric Conversion Act was passed and signed in 1975. It contains no mandates, sets no deadlines, is presently without teeth. It has been critically called nothing more than a sentiment in favor of adopting John Quincy Adams' "ideal perfection for uniformity applied to weights and measures". It's also been called "Un-American", "a Communist Plot", "a Bureaucratic Boondoggle". The middle of the road fact is that the U.S. cannot and should not continue to isolate itself as the only place in the world where inches, pounds and quarts are the major measurement units. This nation is and has been moving toward metric conversion without strong legislation. Putting conversion on a purely voluntary basis without any time frame stilled most critics advocating "no conversion at all".

Whether voluntary conversion can work, whether the changeover will "be more than the economy can bear", whether we can function with a dual system of inch-pound and metric units, or to the extreme, whether the public will ultimately deny metric conversion and stick with our old system in an isolationist role - these are the questions being addressed right now.

The general feeling in the country today is that "if I had to vote, I'd vote against metrication" - simply because it's more comfortable to remain with the familiar. However, there is a growing acceptance of the inevitability of metrication and it's increasingly apparent that our world economy really will not allow us to remain with our isolationist measurement status quo.

(to be continued in the next issue of Metric Comments)

WHERE DO WE GO FROM HERE?
AN ALTERNATE PLAN

Losing your federal funds? Join the crowd! Whether your pet program is metric, career or consumer education, women's equity, energy or environmental education-whatever-the teacher center concept may be able to help your project survive. The federal teacher center program is also a victim of the recent budget cuts, but many of the formerly funded centers have, with the help of the local school districts they serve, been able to continue operating.

The primary function of teacher centers is to offer to teachers in elementary and secondary schools relevant inservice based upon assessed needs at the local level. The centers have facilitated educational improvement in a cost-effective and time-saving manner, have raised the morale of teachers and, in many cases, of administrators and have been a means of information dissemination that has been invaluable on both local and national levels.

Many centers have been the recipients of other discretionary grants - such as metric education, career education and women's equity and have been able to carry on these programs after the initial grant period through establishing material centers for teachers on the various topics and offering workshops, services and courses in the areas of concern. Many centers have been active in these areas without receiving funds, for they are free to offer inservice, curriculum development and materials in any area of need in their districts.

This is an opportune time for consolidation of resources in education. Fewer dollars can aid more districts through regional coordination of services. Programs now undergoing federal budget cuts can be continued to some degree, at least. Centers presently in existence can serve as models and perhaps even as nuclei for larger, regional centers if the proposed legislation is passed.

If you are interested in starting a service center network in your state, you might begin by contacting the center or centers already established near you. As of September, 1981 there should be a federally funded teacher center in every state, for this was a requirement of last year's regulations for that program. Your state department of education will have a list of centers in your state and there is a contact person in your state department who is assigned to the teacher center project. He or she will be able to give you more detailed information about such centers and can put you in touch with the center director or directors.

It is now up to us as interested individuals to see to it that good programs are continued and they can be with the assistance of agencies such as teacher centers. Don't wait for the other person to act - it may not happen! Devise an alternate plan now and let's go on from here!

Ann Boling, Coordinator
Jackson, MS Teacher Center

CONVERSION PLAN FOR CHEMICAL PRODUCTS

The Chemicals and Allied Products Sector Committee (CAPS), endorsed by ANMC's Steering Committee in October, 1981 proposed a conversion plan that shipping and billing of industrial chemicals be predominately in metric units by mid-1984.

BIOGRAPHICAL BACKGROUND

Dr. Barbara Berman and Dr. Fredda J. Friederwitzer
Co-Directors, Project STAMP
Educational Support Systems, Inc.
446 Travis Avenue
Staten Island, New York 10314
(212) 698-3636

Dr. Barbara Berman and Dr. Fredda J. Friederwitzer are currently Co-Directors of two federally-funded Metric Education Projects in New York and New Jersey. They are mathematics consultants to The Cuisenaire Company of America, The Educational Improvement Center/Northeast in West Orange, New Jersey (an agency of the New Jersey Department of Education), as well as to numerous school districts, State education departments and private schools across the United States.

In past years, they have served as Co-Directors of National Science Foundation-sponsored mathematics education programs for inservice teachers and Office of Education metric education projects at the Graduate School of Education, Rutgers University.

Berman and Friederwitzer have worked as a team in metric and mathematics education for the past six years as:

- Frequent speakers at national and regional conferences
- Co-authors of journal articles, elementary curriculum for students and teacher inservice materials
- Instructors of preservice and inservice teachers at the college and university level.

Dr. Berman was an elementary classroom teacher with the New York City Board of Education. Her experience includes many years in urban, inner-city schools at all grade levels. Dr. Berman is a member of numerous professional organizations including the New York Academy of Sciences, and the National Council of Teachers of Mathematics. She has been included in Who's Who of American Women for 1982.

Dr. Friederwitzer has worked with preservice and inservice elementary school teachers in mathematics since 1973. She has teaching experience at the elementary and junior high school levels for the New York City Board of Education. Dr. Friederwitzer is a member of many professional organizations, including the National Council of Supervisors of Mathematics, the National Council of Teachers of Mathematics, and the Association for Supervision and Curriculum Development.

BRANDYWINE SCHOOL DISTRICT

PENNSYLVANIA AVENUE
CLAYMONT, DELAWARE 19703
(302) 792-3800

FOR: PRESENTATION TO THE HOUSE OF REPRESENTATIVES COMMITTEE ON SCIENCE AND TECHNOLOGY

Mr. Chairman, on behalf of the Four-District Metric Consortium of New Castle County Schools of Delaware I am pleased and honored to have this opportunity to share with you my views and experiences relating to the teaching of the metric system in our schools.

We have been fortunate in the State of Delaware to have had two federally funded metric projects - one, a State-wide project in 1976, and the present project in New Castle County.

In addition, the Delaware State Board of Education has among its policies -

1. That the metric system become the principal system of measures in the curriculum of the elementary and secondary schools in the State.
2. That metric conversion be implemented in the schools with the express intention of ensuring that programs of instruction become predominately metric by September, 1980.

The community of New Castle County in which I live is the home of the duPont Company and as a result has many research scientists.

All of this would lead one to believe that the community, the school administrators, and teachers would be very pro-metric education; that the schools would have by this time fully integrated the metric system of measurement in all the disciplines.

This has not happened. Many educators are beginning to consider SI metrics as the fad of the late 1970's. Many are just waiting for it to fade away so we can go back to our more comfortable customary system.

This point of view has been fostered in many ways. Recently there were two editorials in the local newspaper both very anti-metric. One dealt with the difficulties of going metric, while the other suggested it would be far better to sell gasoline by the quart since as the price goes up we could then resort to pints. A parent in our district even went so far as to inform one of our metric resource teachers that the metric system was nothing but a Communist plot.

As a result, educators and School Boards who are making the decisions concerning school funds are not including the teaching of metrics as a priority. If we did not have our present project this year, I am convinced that many of our teachers would only be giving cursory attention to the metric system.

Our project, the Metric Advancement Development Effort (MADE) is centered in grades 4 through 8 -- grades which we consider critical for the mastery of measurement skills. In a 1979 survey, 82% of the teachers in these grades expressed a need to improve the quality of teaching metrics in New Castle County and 69% indicated a need for additional inservice and assistance in teaching metrics. 72% of the parents surveyed at the same time believed the country was moving in the direction of increased use of metrics, while 95% expressed an opinion that the local community was not prepared to function in the world of metrics.

Based on these statistics, we proposed a project to assist the teachers in providing more effective classroom instruction and provide for parents to gain more insight into the metric system.

A Metric Source Book for grades K-8 was written and distributed to each teacher in the twenty project schools. Each project school was provided with a trained resource teacher. Students were pre-tested in each school prior to instruction. Post-testing will take place later this year.

The pre-test did show that our students' knowledge of the metric system was very limited -- only 6.5% of the 8533 students in grades 4 through 8 achieved a score of at least 75% on the pre-test. We also found that our resource teachers were not as knowledgeable as we had thought. On a pre-test of metric concepts only 9 of 19 received a score of 75% or better. After an intensive one week workshop, all teachers scored at the 75% level or better.

We are also taking advantage of every opportunity to make the public more aware of what is happening in the schools and to assist them in becoming more knowledgeable about the metric system. On March 4-7, an exhibit will be held at a Wilmington shopping mall where students will display their metric projects. They will have hand-outs and assist anyone interested in determining his or her weight and height in metric units.

During metric week, metric open houses are planned in each of the project schools. Parents will not only be able to view the accomplishments of the students, but will also have the opportunity to actually become involved in measurement activities.

It is our belief that teachers need this additional support to teach metrics effectively. For the first time we believe the metric objectives in our curriculum are being presented effectively and are being mastered. This has been accomplished only through Federal funds, money which would not have been available through any other source.

With the discontinuance of the metric education program, the proposal to dissolve the U.S. Metric Board, the negative editorials in the newspaper, and the negativism of the media in general, the schools and the public are interpreting this to mean a retrenchment in the move toward a metric America.

Many fine projects have been funded over the past five years through the metric education program. Somehow there needs to be created an agency, a department or a foundation to disseminate these worthwhile programs to the LEA's throughout the United States. Otherwise the efforts of the directors of these projects will have been all for naught.

We must understand that in today's climate, the priorities of the educational leaders at the local level do not include the metric system. With the emphasis on discipline, back to the basics, etc., metrics does not have a place.

Unless the Federal government takes a leadership role in metric education we will, in the near future, be producing students who are illiterate in metric measurement. Dissemination of exemplary projects developed through the metric education program would ensure that this does not occur. This would not only provide the LEA's with the assistance necessary to implement the SI metric system, but also indicate to the public that the U.S. is indeed serious about the changeover to metrics.

Let me express my gratitude once again for the opportunity to appear before this committee. I would be more than willing to answer any questions you may have concerning my remarks or my views on implementation of the metric system in the schools.

February 8, 1982

Respectfully Submitted

Charles E. Eisenbise

Charles E. Eisenbise
Director Project MADE
New Castle County Schools

Testimony
Before
The House Science and Technology Metric Oversight Committee on Metric Development in the United States

presented by

Dr. Janelle A. Elrod

Troy State University

Thank you Mr. Chairman for the opportunity to speak on a quiet but critical issue in the United States.

Troy State University proposed a project to train and conduct workshops in the use of the metric system of measurement. Centrally located to the twenty-three city and county school systems and two private school districts in southeast Alabama which were the targets of the project, Troy State University is ideally situated to render this service to teachers and students of this region. The southeast Alabama region is an area where socio-economic and educational levels are low. Alabama ranks 49th economically and 47th educationally, with median income of $7,266 and median grade completed of 10.8. Yet examination of Table 1 shows the southeastern region of Alabama has median income of $5,487 and median grade completed 9.3, clearly below state of Alabama figures. Since low socio-economic and educational attainment of parents have been found to reflect in the competencies of their children, these figures are evidence of a special need for attention to this area.

Table 1
Median Education and Family Income
Southeastern Alabama Counties

County	Grade Completed	Income
Barbour	9.0	$5,133
Bullock	8.4	3,737
Butler	9.0	5,331
Coffee	10.5	6,776
Covington	9.2	5,930
Crenshaw	8.8	4,527
Dale	12.2	7,401
Geneva	9.4	5,787
Henry	9.5	5,139
Houston	10.9	7,376
Lowndes	8.6	3,823
Pike	10.1	5,644

Table 2
Alabama School Systems Ranked by the
California Achievement Test Results
1979

City		County	
Andalusia	39	Barbour	120
Daleville	31	Bullock	121
Dothan	16	Butler	104
Elba	25	Coffee	34
Enterprise	11	Covington	55
Eufaula	51	Crenshaw	88
Florala	88	Dale	21
Geneva	54	Geneva	76
Opp	25	Henry	93
Ozark	40	Houston	43
Troy	51	Lowndes	122
		Pike	93

Systems with identical average scores have same rank.

In the spring of 1979 all public school students in Alabama were administered the California Achievement Test (CAT). These scores provided a method for ranking the 124 school systems with complete results out of the 127 school systems in Alabama. Perusal of the rankings of the target area systems listed in Table 2 indicates poor performance by students, especially in county systems. Furthermore, item analysis of sample tests revealed fewer correct responses on items containing metric vocabulary.

School system personnel have indicated that most teachers received their educational training prior to emphasis upon metrics, which resulted in limited metric knowledge. Although some teachers have attended lectures in metric education at mathematics conferences, over eighty-five percent of the school systems have no concerted, long-range training of key personnel who could serve as a database for the training of their peers. These facts, along with CAT scores and item analysis of CAT results, prompted many school officials to recognize a need for training of their personnel. (See Appendix B.)

A survey of Alabama Council of Teachers of Mathematics members in the southeastern region of

Alabama reports topics where teachers felt assistance or training was needed. All grade levels perceived a need for instruction in metrics. (See Table 3). However, although teachers express a need for such workshop activities, attendance has declined at regional and statewide conferences. Project Mathematics, a statewide conference jointly sponsored by the universities in Alabama and housed at Auburn University, has been discontinued due to poor attendance. Reasons cited by participants for declining participation included limited financial resources and increased gasoline cost. These factors suggested a need for a method to train competent personnel who could provide in-service training to teachers within their school systems on a subject of perceived need, the metric system of measurement.

Project Description, Objectives, and Strategies

Troy State University solicited applications from elementary teachers in each public school system and private school district in the target area. Project director selected no more than two teacher trainees from each system and no more than four private school teachers, limiting the total group to twenty-five. During the fall quarter of 1980,

Table 3

ALABAMA COUNCIL OF TEACHERS OF MATHEMATICS DISTRICT IX, 1980

Andalusia, Alabama 36420

WORKSHOP TOPICS

As suggested by participants, not in rank order:

Secondary

1. Methods for teaching word problems
2. Use of Computer in the Secondary classroom
3. METRICS
4. Remedial Education as applies to meeting competencies
5. New Terminology
6. Areas of concentration needed in high school
7. Coordination of college and high school math programs
8. Motivation of academically inferior students
9. Motivating disinterested students
10. Extra-curricular activities interfering with academics. I understand that this sounds like an administrative problem, but I am concerned with the aspect whereby the students do not have time to do homework. Is this a unique or a universal situation?
11. In a normal classroom situation, how do you provide for students who have not passed a math course since the fifth grade but are now enrolled in general math?
12. Methods for adding variety and creating enthusiasm.

Jr. High-Middle

1. Methods for teaching word problems
2. METRICS
3. Remedial Education as applies to meeting competencies
4. Motivation of academically inferior students
5. Motivating disinterested students
6. See # 10 above
7. See # 11 above
8. See # 12 above

Elementary

1. Motivation of disinterested students
2. Remedial education as applies to meeting course competencies
3. METRICS
4. Methods for adding variety and creating enthusiasm

September through November, project director conducted a seminar for the twenty-five selected teacher trainees for twenty class hours. Seminar topics included acquisition of metric knowledge and the planning, development and implementation of metric workshops designed for teachers. During the seminar, the teacher trainees, directed by project director, formalized plans for conducting workshops, purchased and designed metric materials, and developed audio-visual aids suitable for their particular locale. By the end of the quarter, teacher trainees developed suitable expertise to become workshop coordinators. These coordinators will provide a stable educational base for dissemination of metric information.

During the seminar the participants participated in the following learning activities:

A. Reviewed audio visual filmstrips on metrics in learning laboratory developed under National Science Foundation CAUSE Project SER76-15469.

B. Participated in ''hands on'' activities designed to move from concrete to abstract metric concepts.

C. Surveyed the use of the metric system, emphasizing estimations and techniques for an effective conversion from the customary system of measurement to the new metric system.

The previously mentioned activities aided in the development of the objectives of seminar meetings which included:

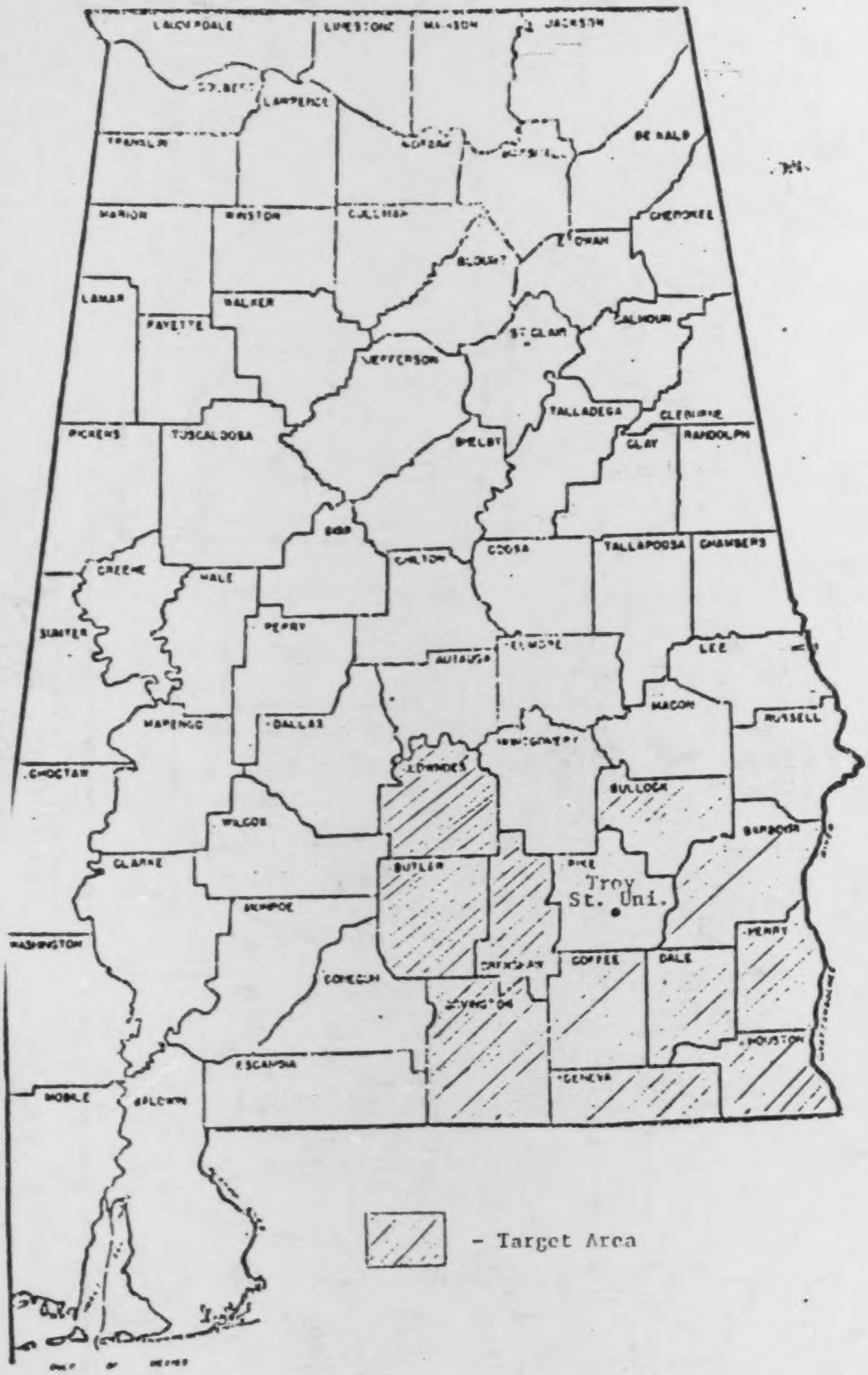
1. To develop strategies and activities for teacher utilization with students in the classroom.
2. To familiarize seminar trainees with with the metric system.
3. To develop in-service workshop presentation and activities.
4. To practice workshop presentation and activities.
5. To improve teacher trainees ability to use and estimate using metric units.

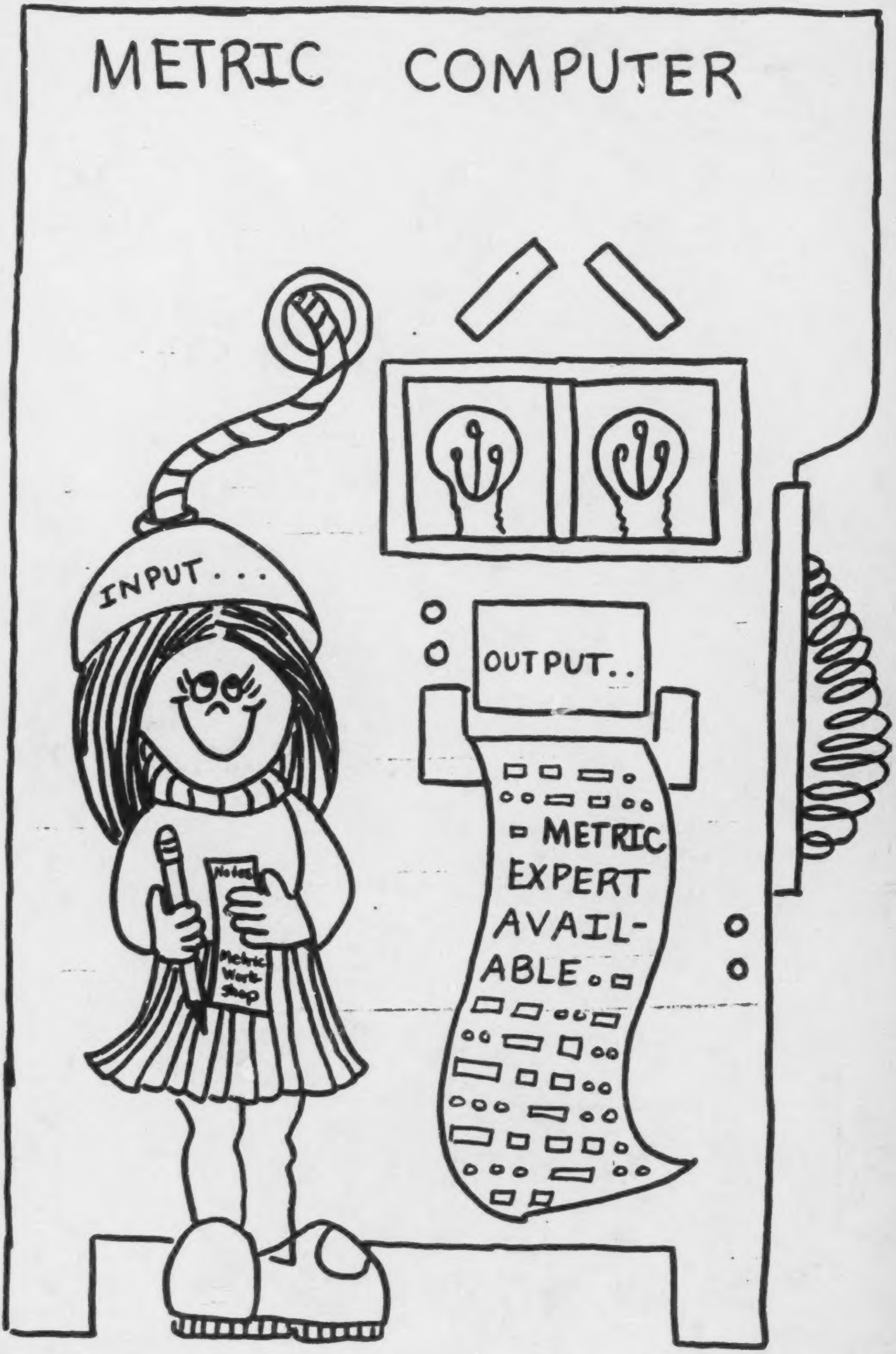
Beginning in December, the project director will coordinate and supervise the presentation of workshops by the coordinators as in-service training for each elementary school faculty within the participating school systems. Approximately 103 elementary schools exist in the target area, representing at least 600 teachers. As well as teaching metric knowledge, the workshop coordinators will focus on effective utilization of metrics in the classroom, thus encouraging teachers to implement metric education for the 20,000 children under their supervision. Once a month coordinators and director will assemble to review the progress of workshops, revising and improving the presentations. A video-tape recording of one workshop will be made and filed for accessibility to classes and school systems through library loan.

At the present time, two in-service workshops have been completed. Due to the snow and ice storms experienced in Alabama, some workshops have been cancelled and we are in the process of rescheduling. Based upon seminar participants reactions and limited workshop in-service evaluations, participants are enthusiastically supportive of the metric education program. Evidence of their enthusiasm is the booklet ''Metric Computer: What I've Always wanted to know but was Embarrassed to Ask! '' which is included at the end of this report. All teachers recognize the need for metric education and are committed to the improvement of metric skills, both for their students and for themselves. The metric education program has been an effective vehicle for this improvement.

Again let me give my personal thanks to you for allowing me to share my views and experiences on metric education. Should you have any questions, I will be happy to respond.

State of labama




METRIC COMPUTER
INPUT...
OUTPUT..
METRIC EXPERT AVAIL-ABLE
Notes
Metric Work Shop

METRIC EDUCATION FOR ELEMENTARY TEACHERS

prepared by

Sherri L. Royals
Laura J. Tatum
Mary Lois Wilson

with support from Grant No. G008100181

U.S. Department of Education
and
Troy State University

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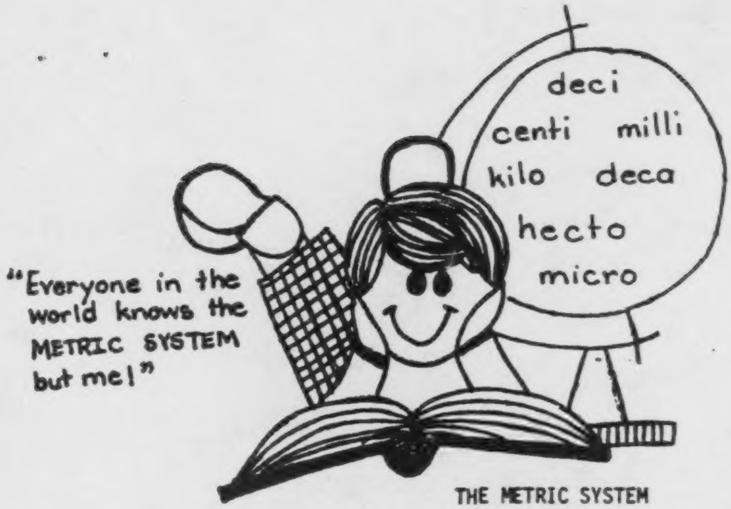

deci
centi
milli
kilo
deca
hecto
micro
"Everyone in the world knows the METRIC SYSTEM but me!"

THE METRIC SYSTEM

"What I've always wanted to know,
but was embarrassed to ask!"

1. Question: Where and when did the metric system begin?
   Answer: It began in France in 1796.

2. Question: Why was the Metric System established?
   Answer: People wanted a simple system of measurement that could be easily converted from one unit to another. The Metric System was chosen because all units are based on 10 like our Dewey Decimal number system.

3. Question: Why was the Metric System brought to the United States?
   Answer: In 1866, Congress made the Metric System legal in the United States.

4. Question: Was the United States the only country that made the Metric System legal?
   Answer: No. In 1875, the United States and several other countries established the Treaty of the Meter. The countries agreed that the world would adopt the Metric System as the basic system of weights measurement.

5. Question: Did the Treaty of the Meter make the etric ystem identical in all parts of the world?
   Answer: Basically, the system was the same. However, "little things" were different. For example, abbreviations for metric units varied; e.g., liter: L, l, or l.

6. Question: Did all these "little things" remain varied?
   Answer: No. In 1960, The Conference on Weights and Measures agreed to establish The System Internationale (French origin) or SI. It is also referred to as The International System. The SI ironed out all the "little" differences in the Metric System.

7. Question: Was the United States forced to convert to the Metric System by law?
Answer: No. In 1975, The Metric Conversion Act was established. This stated that the United States would voluntarily convert to the Metric System. The United States Government began to pool resources to reach the goal of 1982. However, today, we are not 50 percent metric.

8. Question: Was the Metric System as new to other countries as to the United States?
Answer: No. The Common Market Nations have used it for years. In fact, in 1978, these nations agreed not to accept imports from the United States unless metric dimensions were given.

9. Question: Are the Common Market Nations the only reason that the United States is turning to the Metric System?
Answer: No. The United States Department of Agriculture, NASA, the U. S. Patent Division, and the U. S. Weather Bureau all utilize metric units as their basis of weight and measurement. Even major U. S. oil companies are already computing in metric units.

10. Question: Is the United States the only country that is not using the Metric System as the basis of weight and measurement?
Answer: The United States is only one of four countries that is not metric and the only major nation. The other three are Burma, Yamin, Brumeii. All other countries utilize the Metric System as their basic system of weights and measures. However, the inch-pound system is used in other countries.

11. Question: Has the United States' use of the inch-pound system caused any problems in the past?
Answer: In the past, goods that the United States exports were required to have dual labels (one metric, one inch-pound). Today, France no longer accepts fruits and vegetables that are not in metric containers. In 1989, the Common Market countries will no longer favor inch-pound or dual labels. Only the SI (metric) will be accepted.

12. Question: If we must learn the Metric System, are there basic standard units for the Metric System like the comparable basic units of the inch-pound system?
Answer: Yes. They are the following:
1. Length: meter (m)
2. Mass (weight): kilogram (kg)
3. Time: seconds (s)
4. Electric current: amperes (A)
5. Temperature: kelvin (k); Celsius (^{o}C)

13. Question: With what metric unit do you suggest we begin our study and why?

Answer: Time is the most feasible due to the fact that we already compute time in seconds and many in the United States are already familiar with the 24-hour clock. The 24-hour clock has been used by the United States Military for years.

14. Question: How does the 24-hour clock work?

Answer: Four digits are always used with no colon. The clock begins at midnight 0000, and continues 0001 (12:01 a.m.), 0002 (12:02 a.m.), and then 0100 (1:00 a.m.), 0235 (2:35 a.m.) 1100 (11:00 a.m.) until noon or 1200 (12:00 p.m.) is reached. Each hour and minute after noon is reached, is added to 1200. For example, 2:35 p.m. becomes 1200 + 235 = 1435, and 11:35 p.m. becomes 1200 + 1135 = 2335 and so forth.

15. Question: Won't we face a problem when we add hours and minutes? For example,

$$\begin{array}{r} 0945 \\ \underline{+0730} \\ 1075 \end{array}$$

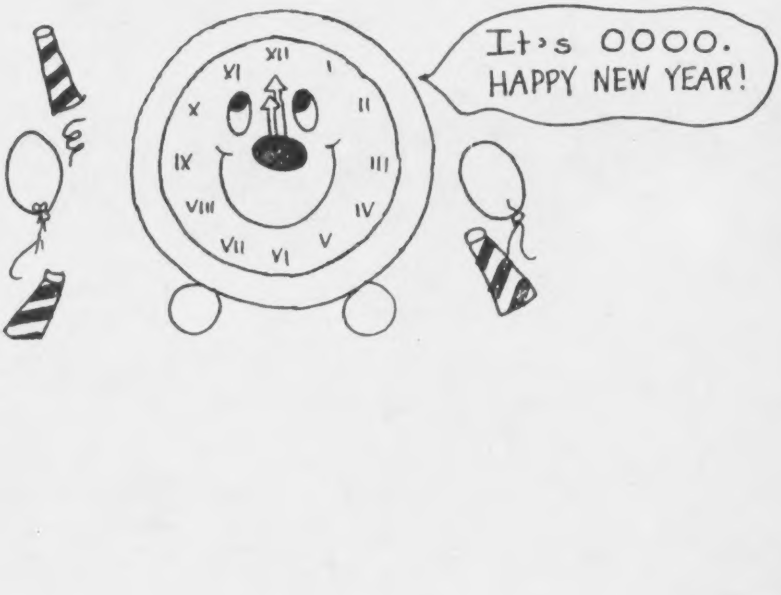
Answer: Just as in conventional time-telling, we must convert 60 minutes into one hour. Therefore, in 1075, 75 will be converted into 60 (one hour) + 15 or 115. Then we will add 1000 + 115 = 1115.

16. Question: Besides writing the time of the day differently, will the method of writing the date differ?

Answer: Yes. The date will be written first, then the month, then the year. There will be no commas, only a space left between each; e.g., 24 January 1980 or 24/1/80.

17. Question: Can you suggest any activities that will provide practice and reinforcement in actually using the 24-hour clock?

Answer: Yes. On the following page, a written exercise and a time concentration game have been formulated to practice using the 24-hour clock.



Written Exercise

A. Write the answers to the questions below, using the 24-hour clock as the time basis.

1. What time do you get up in the morning?
2. What time do you go to school?
3. What time do you eat lunch?
4. What time do you get out of school?
5. What time do you eat dinner?
6. What time does your favorite T.V. show come on?
7. What time do you go to bed?
8. What time is it now?
9. Twelve hours from now, what time will it be?
10. Three hours ago, what time was it?

B. Write these times, using the 24-hour clock as a base.

	Answers
1. 7:40 a.m.	(0740)
2. 6:00 p.m.	(1800)
3. 12:25 p.m.	(1225)
4. 10:42 a.m.	(1042)
5. 12:01 a.m.	(0001)
6. 11:54 p.m.	(2354)
7. 2:10 p.m.	(1410)
8. 10:30 p.m.	(2230)
9. 1:29 a.m.	(0129)
10. 10:42 p.m.	(2242)
11. 5:45 a.m.	(0545)
12. 9:30 p.m.	(2130)

Concentration

Make a deck of 36 cards (4" x 4"). Write times using a.m. and p.m. on 17 of the cards. Write the corresponding 24-hour clock time for each of the 17 on another 17 cards. On the two remaining cards, write WILD CARD.

Directions: Lay the cards face down on a flat surface--6 rows of 6. Needed: two players, two checkers. The first player will turn over a card and attempt to turn over another card that corresponds to the given time from the remaining deck. For example, if the player turns over 1520, he tries to find the corresponding the corresponding 3:20 p.m. to make a match. If he turns over WILD CARD, he automatically scores a match. If a match is scored, the player receives another turn. However, if the player does not get a match, the other player tries to find a match. The checkers make sure all matches are correct. The object of the game is to get the most pairs or matches.

18. Question: Time sounds easy enough, but is there anything else about the Metric System as simple?
Answer: Yes. If you know a few prefixes, you've got the rest of the Metric System "under your hat!"

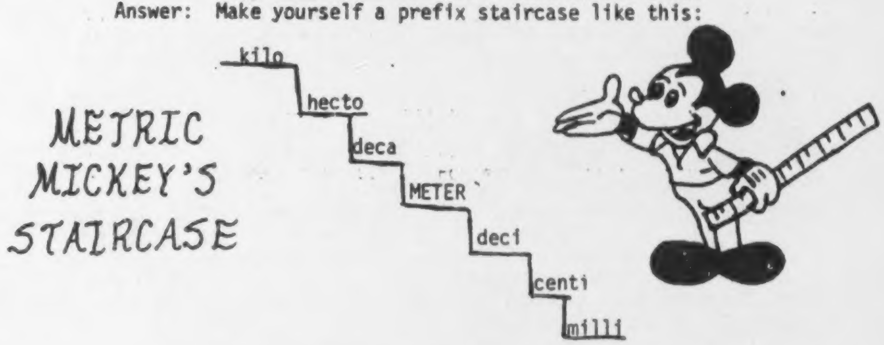
19. Question: What are the prefixes?
Answer: They are the following:

		tara/	
		giga/	
		mega/	
*	k	kilo/	1000 of
	h	hecto/	100 of
	da	deca/	10 of
e.g., meter (for measurement)	...	Unit	
	d	deci/	.1 of
	c	centi/	.01 of
	m	milli/	.001 of
		micro/	
		nano/	
		pico/	

*Prefixes in box used frequently.

20. Question: Can you give me some examples? I need lots of practice.
Answer: For example, if we are working with the basic metric unit of measurement (e.g., the meter), and we had 10 meters, we would call it a decameter. If we had .001 or 1/1000 of a meter, we would have a millimeter.

21. Question: But, what if I had 25 decameters and I wanted to know how many centimeters I have. What should I do?
Answer: Make yourself a prefix staircase like this:



Make seven steps. Put the basic unit (the meter) on the middle or fourth step. On the top steps, write the names of the whole number prefixes in consecutive order, and on the bottom steps, write the fractional prefixes as shown above. Your question was 25 decameters = __?__ centimeters. The trick is to put your 25 on the deca stair and count how many steps you go down (to the right) to get to centi.

22. Question: How many did you move down and across?
Answer: Three.

23. Question: Right; so move your decimal point to the right of 25 three digits, and what do you get?
Answer: 25,000.

24. Question: Yes. So 25 decameters = __?__ centimeters?
Answer: 25,000 centimeters.

25. Question: 36.87 mm = __?__ meters?
Answer: I go up the stairs three steps to the left so I move my decimal point three digits to the left like this .036,87, and I get .03687 meters.

26. Question: But, I know in my mind about how long a year is, and a foot is. I have no idea how long metric length measuring units are. How can I familiarize myself with these units?
Answer: Well, you probably learned how long a foot is by pacing it and how long a yard is by measuring from the tip of your nose to the tip of your finger on your outstretched arm. So, why can't you do some of the same things with meters, centimeters, etc.?

27. Question: Tell me how.
Answer: O.K. I'll list a few simple activities you can do to familiarize yourself with metric length.

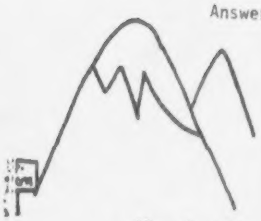
1. Take a meter stick and find as many things as you can in the room that measure approximately one meter.
2. Pace a meter (practice).
3. Have a few people measure four to five distances with the meter stick. Mark these distances. Then, other people will be asked to pace the distances and record how many meters each distance measures. See how close the pacing is to the actual measurement with the meter stick.
4. Find parts of your body that are one meter long, one decimeter long, and one centimeter wide.
5. Estimate lengths of various objects; then measure and see how close you come to exact measurements.

28. Question: What if I need a familiar comparison for a greater length; e.g., a kilometer?
Answer: Most road signs give this comparison:

A mile is a "little bit" longer than a kilometer.

29. Question: If I have a large number like 240,000 centimeters, do I use a comma to separate the numerals?
Answer: No. In the Metric System, use spaces after every three numerals; e.g., 240 000 centimeters.

30. Question: Is there any way, other than the staircase, to remember the prefixes for the Metric System?
Answer: Yes. You can also make a vertical chart. The basic unit is still in the middle:



km	hm	dam	m	dm	cm	mm
1000	100	10	1	1/10	1/100	1/1000

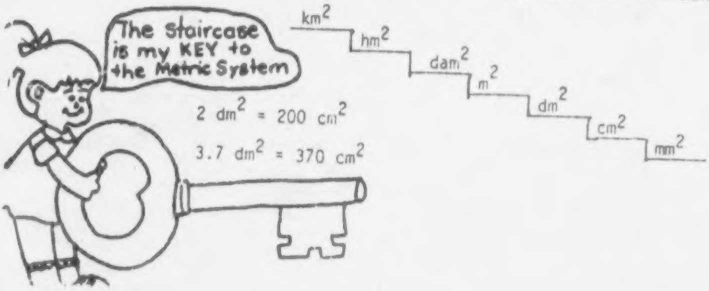
Use the one easiest for you.

31. Question: How do you figure area in the Metric System?
Answer: Area represents a covering in the Metric System just as it does in our "inch-pound" system. You still multiply: area equals length x width. Remember, both length and width must be in the same unit; e.g.,

Area = 2 cm^2 x 4 cm^2 NOT 2 cm^2 x 4 mm^2.

32. Question: Does a unit squared (e.g., 2 cm^2) have a significant meaning?
Answer: Yes. Any squared unit means you are measuring area.

33. Question: With units squared, do I still move the decimal on the staircase one space from dm^2 to cm^2?
Answer: No. With squared units, you move in blocks of two:



2 dm^2 = 200 cm^2

3.7 dm^2 = 370 cm^2

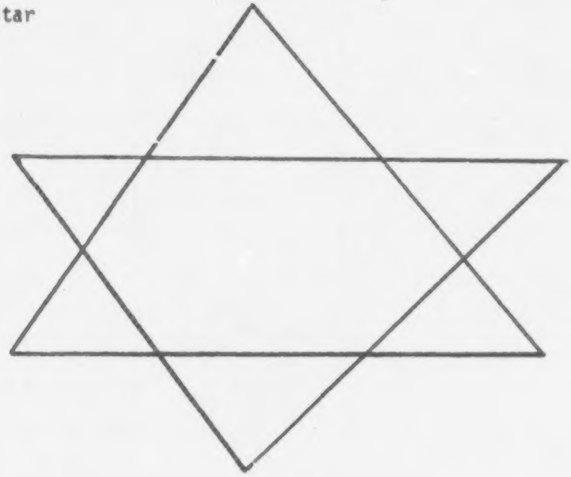
34. Question: What about 12 m^2 = ________ cm^2?
Answer: 1200 cm^2 (Remember, move in blocks of two.)

35. Question: Can you suggest some work to practice finding areas?
Answer: Yes. Use a one-centimeter grid for the following written exercises. (See grid next page.)

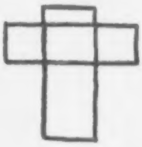
Written Exercises

- Find the area of the following and compare with others' answers for an average by which to check your work.

1. A star



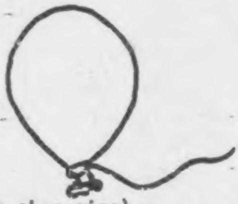
2. A cross



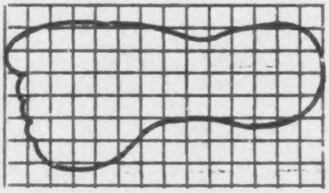
3. A flower

4. A heart

5. Personal things you keep with you such as a check, a driver's license, a credit card, or a picture of a friend
6. A blown-up balloon (a real challenge)



7. Your foot traced on the grid (compare with shoe size)



36. Question: Do we use only cm^2 for area measurements?
Answer: No. Basically, we use km^2, m^2 or cm^2.

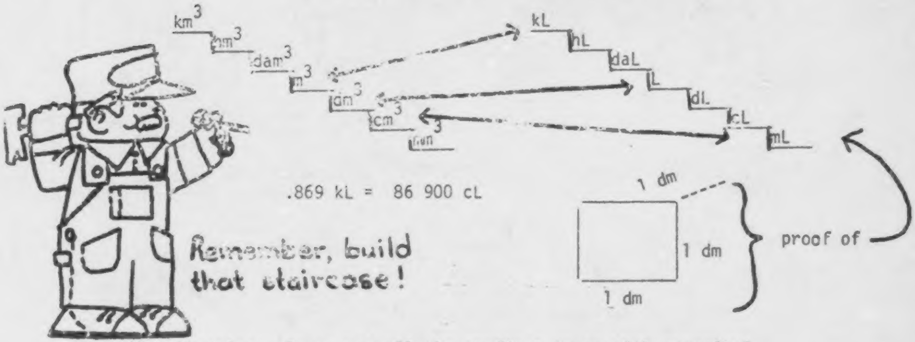
37. Question: How do I measure large land areas?
Answer: Good question. There are only two differences from other area measurements: (1) are = 1 dm^2 or 100 m^2, and (2) hectare = 1 km^2 or 10 000 m^2 or 100 are. Unless we are dealing with real estate or farming, we probably won't be concerned with these.

38. Question: In measuring area, do the prefixes and base remain the same?
Answer: Yes, and the formula also remains the same; e.g., A = lxh.

39. Question: What is the difference between volume and capacity?
Answer: Volume is the amount of space an object (water) occupies. For example, V = lxwxh or V = object cubed. Capacity is the amount something holds. In the Metric System, volume is measured in liters.

40. Question: So, is the liter another basic standard unit?
Answer: No. The liter is simply the measure of capacity or the amount something will hold. The abbreviation for liter is L. The capital L is used to avoid confusion with lower case l for length or the numeral 1 (one).

41. Question: Does the staircase remain the same with the liter?
Answer: Yes. The staircase is in increments of ten, the same as meters. However, one (1) step on the cubic staircase equals three (3) on the L staircase.



42. Question: Do we use all the prefixes to go with capacity?
Answer: No. We only use kL, L, or mL to go with m^3, dm^3, or cm^3.
For example: 1 kL = 1 m^3
1 L = 1 dm^3
1 mL = 1 cm^3
.869 kL = .869 m^3

43. Question: Can you give me some problems with volume? Remember the staircase!
Answer: Yes. Find the following volumes:

1. peach can
2. staple box
3. measuring cup

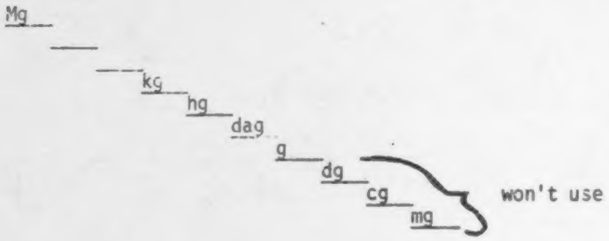
44. Question: Solve the following problems for me.

1. .29 m^3 = ________ cm^3
2. 5.87 dm^3 = _______ m^3
3. 5.87 dm^3 = _______ kL

Answer:
1. 290 000 cm^3
2. .00 587 m^3
3. .00 587 kL

45. Question: Is mass the same as weight?

Answer: No. Mass is the amount of matter an object has. Mass never changes. The root for mass is the gram. Weight is the pull of gravity.



1 g = .001 kg
1000 g = 1 kg
1000 kg = 1 Mg

Mg is a Megagram which is the metric ton or tonne.

46. Question: Can you give some tangible examples for mass in comparison to inch-pound measurements?

Answer: Yes.

1. An apple = 120 g
2. Football player = 100 kg
3. Frying chicken = 2 kg
4. Mouse = 20 g
5. 1 pound = 1/2 kg
6. Penny = 3 g
7. Quart of milk = 1 kg

All you need for mass measurement is g and kg.

Written Exercises

A. Compare the mass of two objects. Weigh one object and try to guess the weight of the other. (This is not easy.)

B. Try your hand on "What Do You Know About Metrics?" (next page).

COMMON UNITS AND MULTIPLES
IN SI

LENGTH	AREA	VOLUME (CAPACITY)	MASS
kilometre	square kilometre		
metre	square metre	cubic metre (kilolitre)	
decimetre	square decimetre	cubic decimetre (litre)	kilogram
centimetre	square centimetre	cubic centimetre (millilitre)	gram

1. Units underlined twice are the basic units.
2. Units underlined once or twice will be used by almost everyone.

WHAT DO YOU KNOW ABOUT METRICS?

Underline the word or words within the parentheses that make each statement true.

1. Someday soon you will buy cloth by the (metre, litre, kilogram).

2. Small measuring spoons will measure in units called (centimetres, millilitres, litres).

3. The mass (weight) of a person will be measured in (metres, litres, kilograms).

4. Small desk-type rulers will measure in (metres, millilitres, centimetres).

5. Milk and gasoline will be sold by the (metre, litre, kilogram).

6. The mass (weight) of a silver dollar will be stated in units called (kilograms, grams, millilitres).

7. The temperature will be measured in (degrees Certain, degrees Celsius, degrees Fahrenheit).

8. The size (area) of a credit card will be stated in units called (square centimetres, square metres, square kilometres).

Record Sheet

	AREA			VOLUME			MASS		
Object	Estimate	Measured Area	Unit	Estimate	Measured Volume	Unit	Estimate	Measured Mass	Unit

47. Question: No matter how easy the Metric System appears, some people just aren't motivated to learn it. Is there anything I can do to motivate others?

Answer: Yes. There is a free film offered by Alabama Power Company entitled "Metric America," which may be ordered from the following address:

Alabama Power Company
Public Information Educational Services
Post Office Box 2641
Birmingham, Alabama 35282

48. Question: Speaking of Birmingham, how cold could it be there now? About 40°C?

Answer: No. Listen to this poem for an educated guess:

30°C is hot.
20°C is pleasing.
10°C is cool.
0°C is freezing.

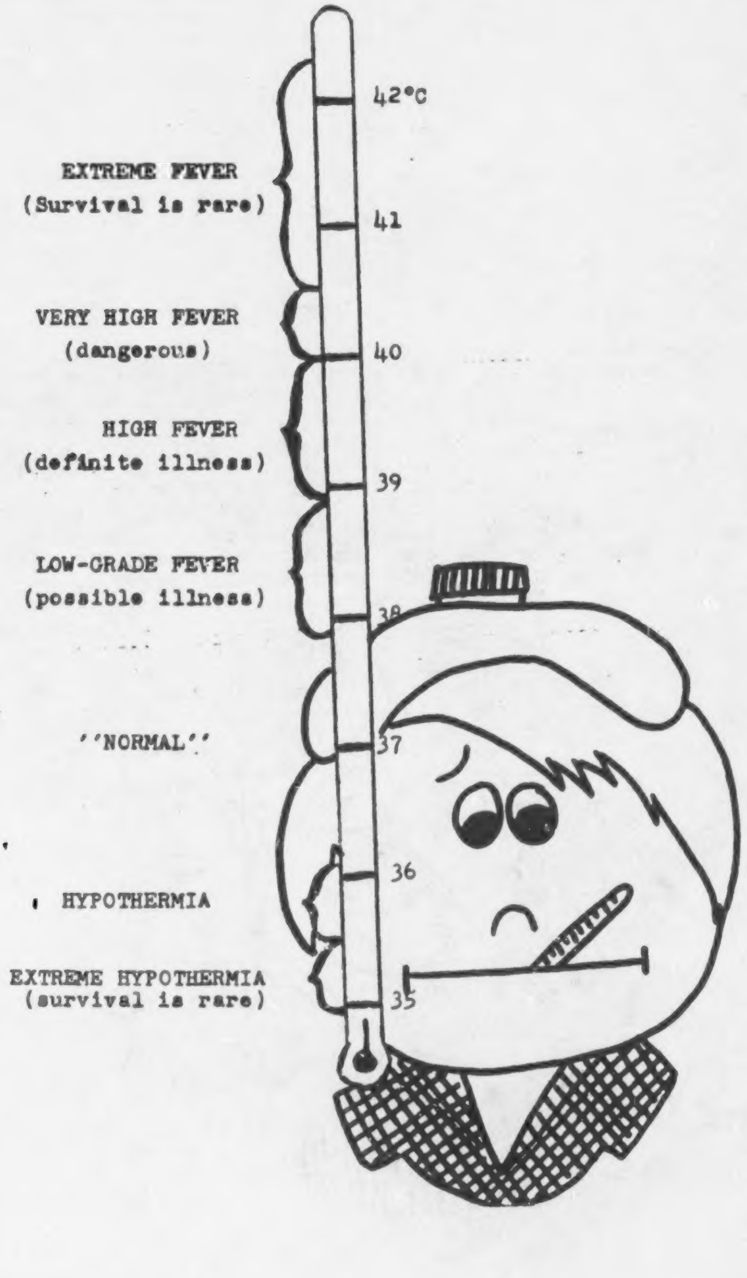
49. Question: What does "C" stand for?

Answer: Prior to 1968, it stood for Centigrade. Then it was changed to Celcius to honor the man who invented the scale.

50. Question: I realize that 0°C is freezing, and that 100°C is boiling, but it's hard for me to think of other examples using the Celcius temperature scale. Can you list some examples for me?

Answer: Yes. Normal human body temperature is 37°C; normal winter room setting is 20°C; refrigerator freezer, 10°C; and a heating pad, 42-43°C. Also, a good reference point to help you relate the familiar Fahrenheit scale to the Celcius scale is to remember that 82°F is about the same as inverted 28°C. Two reference sheets follow to help you become more familiar with the Celcius scale.

HUMAN BODY TEMPERATURES



WHADAYA KNOW ABOUT TEMPERATURE?

A. Consider each event described below. Use an 'X' to indicate whether you think the action at the given temperature in degrees Celsius is reasonable or absurd.

Reasonable	Absurd	Event
		1. Go swimming in water that has a temperature of 32 degrees Celsius.
		2. Make a snowman from snow that has a temperature of 10 degrees Celsius.
		3. Go ice skating on a pond when the air temperature is 25 degrees Celsius.
		4. Lie on a beach at 100 degrees Celsius.
		5. Plant lettuce when the air temperature is 25 degrees Celsius.
		6. Wear long-johns when horseback riding at 40 degrees Celsius.
		7. Water your lawn when the air temperature is 18 degrees Celsius.
		8. Run a body temperature of 98.6 degrees Celsius.
		9. Study in a room which has a temperature of 22 degrees Celsius.
		10. Store meat for months at 15 degrees Celsius.
		11. Drink a cup of chicken bouillon which has a temperature of 65 degrees Celsius.
		12. Drink milk which has a temperature of 4 degrees Celsius.

Metric Education for Elementary Teachers is a federally granted course designed to acquaint area elementary teachers with common metric methods and procedures of measurement. Dr. Janelle A. Elrod, Instructor of Mathematics and Mathematics Education at Troy State University was chosen to direct this course.

The course consists of five four-hour sessions of directed instruction concerning the Metric System, as well as group participation and activities dealing with the Metric System.

Following is a session-by-session account of utilization of in-class activities and instruction.

September 30, 1981

- Metric Pre-Test
- A detailed account of the history of the Metric System
- Basic standard units of the Metric System
- The 24-hour clock with appropriate games and written exercises
- Metric prefixes with "helpful staircase"
- Concrete metric length activities; e.g., pacing a metre

October 17, 1981 (Combined two sessions for eight-hour day)

- Metric area and corresponding staircase and use of centimetre grid to measure area of given objects
- Metric volume and corresponding staircase and measuring activities
- "What Do You Know About Metrics?" worksheet

October 26, 1981

- "Metric America" film obtained from Alabama Power Educational Services
- Discussion of temperature using Celsius scale, including handouts containing common temperatures to be used as references points; e.g., hot soup, cool day, etc.
- Thorough review of all information for Metric Post-Test
- Promotional film on Metric System (for teachers) and "metric party" (see party recipes and songs that follow)
- Metric Skills Test as a means of review for post-test

PARTY FAVORS

(Remember when measuring is required to Estimate, Measure & Record.
Have 3 or 4 different types of candy.

1) Pick one of each of the candies.

2) Order them by mass from smallest to largest. (Estimate)

3) Find the mass of each; of the total for each member of the group; of the total for the group.

4) What is the groups' total mass of candy in kilograms?

5) Complete your favor:

Cut a net square of 400 cm^2

Cut a ribbon 20 cm in length

Place candy in center of square,
draw up sides, & tie with ribbon.

ESTIMATE	MEASURE & RECORD

Make a party favor

METRIC MIXTURE

1) Pour into the measuring cup 100 mL of chocolate chips. Pour onto a plate. Measure the same capacity (100 mL) of coconut, raisins, peanuts and pour each onto a plate. Estimate the mass of each and rank from lightest to heaviest.

2) Find the mass of the 100 mL of chocolate chips, coconut, raisins, and peanuts. Did you rank them correctly?

3) Follow the recipe for metric mixture and mix. Determine how much each person in your group should get. Measure individual portions and place in baggie.

Metric Mixture

Measure and combine the following:

200 g peanuts
300 g chocolate chips
400 g raisins
150 g coconut

Mix with a large spoon. Determine how many grams each person should get. May be served in baggies or nut cups.

ESTIMATE	MEASURE & RECORD

METRIC PUNCH

1) Make Metric Punch:

Mix: 100 g Kool Aid Mix
1 L Water
500 mL Wink .

Mix Kool Aid Mix and water well. Add Wink.

2) Determine how much (mL) each person should get. Measure enough for each person.

3) Determine the temperature of your punch.(Estimate, Measure & Record)

4) Add ice to your punch. Find the temperature of your punch with ice. (Estimate, Measure, Record)

5) While you enjoy your punch, try the following experiment:

Measure 10 mL of water. Estimate its mass. Find its mass.
Measure 100 mL of water & find its mass.
Measure 250 mL of water & find its mass.

Can you make a conclusion about the relationship of milliliters and grams of water?

ESTIMATE	MEASURE & RECORD

METRIC MISH MOSH

1) Select an apple, orange, grapefruit, & banana. Assume that the apples are 59¢ per kilogram, the oranges are 49¢ per kilogram, the grapefruits are 35¢ per kilogram, and the bananas are 25¢ per kilogram.

2) Find out which is the best buy:

FRUIT	Mass of Fruit	Cost of Fruit	Mass of non-Edible part	Cost of Non-Edible part

Rank the fruit in order of value, i.e. rank from fruit yielding the most edible part for your money to the fruit yielding the least edible amount for your money.

3) Chop the fruit and add 30 mL of mayonnaise. Divide the Mish Mosh among the people in your group. Each will get _________g.

ELEMENTARY MATH SONGS

②

Cricket Song
Tune: Little Liza Jane

Cricket sitting on number __________,
Listen to me.
Cricket sitting on number __________,
Hop up (back) one more.

Hey, little cricket, where have you gone?
Hey, Little cricket, what numeral are you on?

(With this song you need a walk on number line. Let one student be the cricket at a time. Can practice counting, addition, and subtraction.)

Geometry Time
Tune: Clementine

Get your geoboards, get your geoboards,
Get your geoboards, just now,
Oh, please get your geoboards for geometry.

Make a triangle, make a triangle,
Make a triangle just now
Oh, please make a triangle, on your
Geoboard.

(Repeat with rectangle, square, etc.)

(For Transformational geometry:)
(After the above "Make a triangle", sing)

Flip it over, Flip it over
Flip it over, just now,
Oh, please flip it over,
On your geoboard.

(Repeat with turn, slide; you need to make the image & figure and let students imitate you. An overhead projector Geoboard is helpful)

We Multiply Today
Tune: Farmer in the Dell

We multiply today,
We multiply today,
We hop two fours
And land on eight,
We multiply today.

(Vary hops to develop multiplication tables)

④

I've Been Working On My Numbers
Tune: I've Been Working On the Railroad

I've been working on my numbers,
All the livelong day,
I've been working on my numbers,
Just to pass the time away
Numbers are so very helpful,
We need them everyday,
Can you say your numbers with me,
Try it once today:

One, two, three, four, five, six and seven, eight, nine, ten, and eleven,
Twelve, thirteen, fourteen, fifteen,
Sixteen, seventeen, eighteen, nineteen, Twenty, twenty-one, twenty-two,
Twenty-three, twenty-four, twenty-five, twenty-six, twenty-seven, twenty-eight, twenty-nine and Thirty.

Now, we've said our numbers,
Say them everyday,
Now, we've said our numbers,
Say them everyday.

Money Man
Tune: Muffin Man

Chorus: Do you know the Money Man,
The Money Man, The Money Man,
Do you know the Money Man,
Who lives on Dollar Drive?

Can you find a nickel,
A nickel, a nickel?
Can you find a nickel
In my Money World?

Yes, I found a __________,
A __________, a __________,
Yes, I found a __________
In my Money World.

(Repeat using dime, penny, quarter, etc.)

Number Tree

Tune: I'd Like to Teach the World to Sing)

I'd like to teach the facts for five,
And build a number tree.
2 plus 3 and 3 plus 2,
It's such simplicity.

(Repeat 1 plus 4 and 4 plus 1
5 plus 0 and 0 plus 5)

Now we've said our facts for five
and built a number tree.
Practice your facts and remember your
Sums, straight from our Number Tree.

(May be used with miltiplication also.)

Place Value Song

Tune: Ninety-nine Bottles

How much is 34 worth?
How much is 34?

3 tens and 4 ones
How much is 34?

(Repeat with different two digit numbers. Students can place numbers on place value chart)

Calendar Song

Adapted to Skip to My Lou by Angela C. Roling

(Dedicated to Puzzle for Parenting)

Days, days, days of the week,
Days, days, days of the week,
Days, days, days of the week
I can say the days of the week:

Monday, Tuesday, Wednesday, Thursday,
Friday, Saturday, then comes Sunday;
Monday, Tuesday, Wednesday, Thursday,
Friday, Saturday, Sunday.
(Repeat Days) ------------------------------

I can say the days of the week,
I can say the days of the week,
I can say the days of the week,
And today is ________________.

Months, Months, months of the year,
Months, months, months of the year,
Months, months, months of the year,
I can say the months of the year:

January, February, March, April,
May, June, July, August,
September, October, November, December,
I can say the months of the year.
(Repeat months) ------------------------------

I can say the months of the year,
I can say the months of the year,
I can say the months of the year,
And this month is ________________.

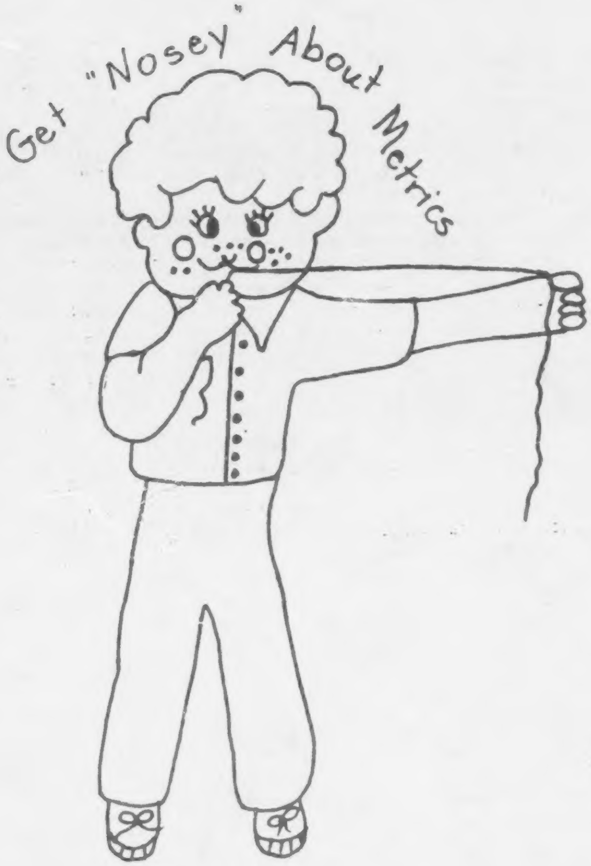
Nineteen Seventy-nine is the year,
1979 is the year,
1979 is the year,
But I was born in '74.

Days, days, days of the week,
Months, months, months of the year,
1979 is the year
But I was born in ('74).

November 18, 1981

- Oral review of Metric Skills Test given during previous session
- Metric Post-Test
- Colleagues within each school system met and devised appropriate pre- and post-tests; planned workshop format and content; and listed materials to be used during workshop
- Small groups composed lists of concepts and activities to be used to teach the Metric System in grades kindergarten through six (see following handout)
- Received following handouts on "Metric Curriculum" and list of addresses of metric resource materials

--Rovals, Tatum and Wilson



METRIC SYSTEM (K-2)

Concepts taught - KINDERGARTEN
1. Matching

Activities Used - KINDERGARTEN

1. Matching
   Example: Show metre stick and centimetre example. Then hold up various objects (e.g. postage stamp) and have them choose device that you would measure selected object with.

Concepts: FIRST GRADE
1. Define measurement
2. Nonstandard units

Activities: FIRST GRADE
1. Ask child to see how many ''pencils'' wide his desk top is. Then ask ''Why are the answers different? Explain that the pencils are not the same length (show them) therefore, the answers will be different.
2. Pass out paper clips. Measure width of desk. Then explain why answer should be the same (''because paper clip is the same length'').
3. Show the centimeter unit. Then ask ''what part of your hand is about the same as a centimeter?'' (little finger) Estimate given objects (width of paper, etc.) using little finger, then teacher will measure with centimeter unit. Give reward to children who are the closest to the correct answer.

Concepts: SECOND GRADE
1. Develop a standard measure
2. Continuation of estimation

Activities: SECOND GRADE
1. Review first grade activities for developing a standard measure.
2. Review kindergarten activities for matching objects to appropriate form of measurement.
3. Introduce meter stick. Find objects in the room ''about a meter long.''
4. Go on a ''treasure hunt'' for meter sized objects.
5. Use meter trundle wheel to follow ''Pirate's Map'' for hidden treasure.

Compiled by:
Sherri Royals - Enterprise
Dianne Harris - Dozier

Third and Fourth Grades

I. Discuss history and concepts of measurements

II. Extend vocabulary (prefixes, symbols, etc.)

III. Teach use of measuring instruments and provide practical application of metric concepts

Specific Activities for above:

I. Research, library, resource persons, bulletin boards

II. Encyclopedia, find metric vocabulary on specific items (ie. boxes, cans, etc.)

III. a) Plan a metric party (where you estimate and then measure and weigh materials and ingredients).
    1. Make cookies
    2. Make punch
    3. Measure, cut and weigh for bird seed bags or candy bags
  b) In conjunction with health
    1. weigh
    2. Measure height, feet, etc.
  c) daily temperature charts
  d) Concentration time game

Fifth Grade

I. History of the Metric System
  A. Teacher Instruction
    1. Lecture
  B. Student Research
  C. Written Activities
    1. Essays
    2. Charts and Posters
    3. Contests and games

II. Estimating measurements
  A. Linear
    1. Parts of the body
    2. Objects in the classroom
    3. Objects around campus
  B. Mass
    1. Objects in the room
    2. Small objects in pockets and purses
    3. Planned measurements of objects brought in by teacher
  C. Capacity
    1. Milks, juices and other drinks
    2. Water
    3. Party refreshments for planned metric party

III. Metric Vocabulary
  A. Prefixes (meanings)
  B. Base Words
  C. Words related to time
  D. Words related to temperature

IV. Standard Metric Terms
  A. Temperature
    1. Boiling
    2. Freezing
    3. Normal body
    4. Comfortable room
  B. Time

V. Simple Conversions
  A. Decimal introduction
    1. Order of prefixes
    2. Converting by multiplication (10)
    3. Converting by division (10)

VI. Actual measurements (Simple)
  A. Linear
  B. Mass
  C. Capacity

Topics Geared Toward Grade Six

I. History of Measurement
  A. Geographical location/dates
  B. Laws
  C. International problems with inconsistencies
  D. Participating countries

II. Teach Prefixes
  Activity: Present introductory film

III. Basic standard units
  A. Length: meter
    a. desks
    b. selves
    c. unsharpened pencil
    d. room
    e. textbook
    f. chalkboard
  B. Mass (weight): kilogram
    1. Weigh
      a. coins
      b. gem clips
      c. pencil
    2. Estimate weight of
      a. textbook
      b. a shoe
      c. box of staples
    3. Compare estimations to accurate weights.
  C. Time: seconds
      Activity: Answer questions about times people wake up, go to school, do homework, watch T.V., etc.
      Also, practice adding and subtracting time through ''Concentration'' card game.
  D. Temperature: degrees Celsius
    1. Read various types of thermometers
    2. Estimate normal room temperatures, hot scup, cold days, etc.

Dr. John Fishler
Orange County Public Schools
P. O. Box 271
Orlando, Florida

Thank you, Mister Chairman, for the opportunity to speak before this committee on behalf of the Orange County Public School System in Orlando, Florida. I represent Metric Education for the nation's 28th largest out of 16,000 school districts with an enrollment of approximately 100,000 students, kindergarten through adult education.

The Florida Metric Education Act, signed into law on June 30, 1977, specified that the metric system be adopted by 1980 as a system of measurement and measurement language in all phases of public education. The Florida Plan for Metric Education, dated January, 1979, outlines the steps in organizing a school district metric program. The plan directs that science, mathematics, and vocational teachers are responsible for instructing pupils in the structure and application of the international system of units. All other teachers are responsible for reinforcing instruction in the structure and application of the SI Measurement System.

Orange County Public School System received a $43,000 one-year federal grant in 1979 to implement a metric training program in the district's 67 elementary schools. The program provided metric education training for all elementary school teachers using staff development to train them in four components aimed at developing identified student competencies.

The 2,000 plus elementary teachers reached 42,000 elementary students in grades K-6 including exceptional and bilingual students. The project was evaluated by a third party evaluator, who reported that the project did accomplish the objective specified in the proposal. The major problem in incorporating metric education within the curriculum was not with the metric system but with the concepts and skills of measurement in general. More emphasis should be placed on the actual practice of measurement activities in the schools. Recommendations made by the evaluator were implemented.

The following year, 1980, we received a $32,000 grant to expand the program at the junior high school level to include 1,050 teachers and 22,000 students. The grant was received in November, 1980, and required the training of teachers and students to take place over a period of two school years. This project was concluded on January 23rd of this year and is in the hands of the evaluator.

Our currently funded federal program for the high school teachers and students is presently in operation and successfully meeting the time line objectives. Forty teachers, four from each of the ten high schools, have been trained in the two components and are in turn training the faculty members at their schools. Extensive public education and awareness is planned in this project through mathematics and science fairs which are displayed in large shopping malls, exposing the projects and their originators to thousands of people. We expect not only to meet the objectives stated in the grant but to far surpass them in public awareness.

We have experienced apathy and in some cases hostility to the metric program. However, we find that the proper people doing the training can overcome the fears and anxieties of the public.

We find that international visitors have had a positive effect on our geographic area because they use the SI language and have forced retail businesses to educate their sales staffs in metrics. The use of metrics in schools and reinforcement by businesses and industry will emphasize its need in dealing with consumers, thereby overcoming many of the negative perceptions of the untrained.

In three years, the metric educational program has reached over one third of the population of our county. Each day another facet of metric measurement if introduced to the public and more use and awareness takes place. A bill is presently before the Florida state legislature to post all distances in metric and customary units with both having the same prominence. The bill is expected to pass. Such action is another positive indicator that the public is willing to accept metric measurement.

Again, thank you for giving me the opportunity to express my professional experiences before this committee. I shall be glad to answer any questions.

John Teschke
Orange County Public Schools
PO Box 271 Orlando FL 32802-0271

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Statement Prepared for
Science and Technology Committee

February 8, 1982

John W. Gregory, Ph.D.
Associate Professor of Mathematics Education
University of Florida

"Thank you Mr. Chairman. On behalf of the University of Florida, let me thank you for the opportunity to share with you my views and experiences with regard to metric education and the impact of the Metric Education Program on our goal for a metric America.

"There are three basic means by which people can be motivated: reward, fear and attitude change. As we focus upon the activities of the past, present and future in regard to changing to the metric system, it is my personal view that all three motivational techniques have been employed in education. This observation is based upon my work in metric education as a classroom teacher, as a director of metric inservice training programs, and as a developer of educational materials intended to facilitate the learning of the metric system by children, teachers and the public.

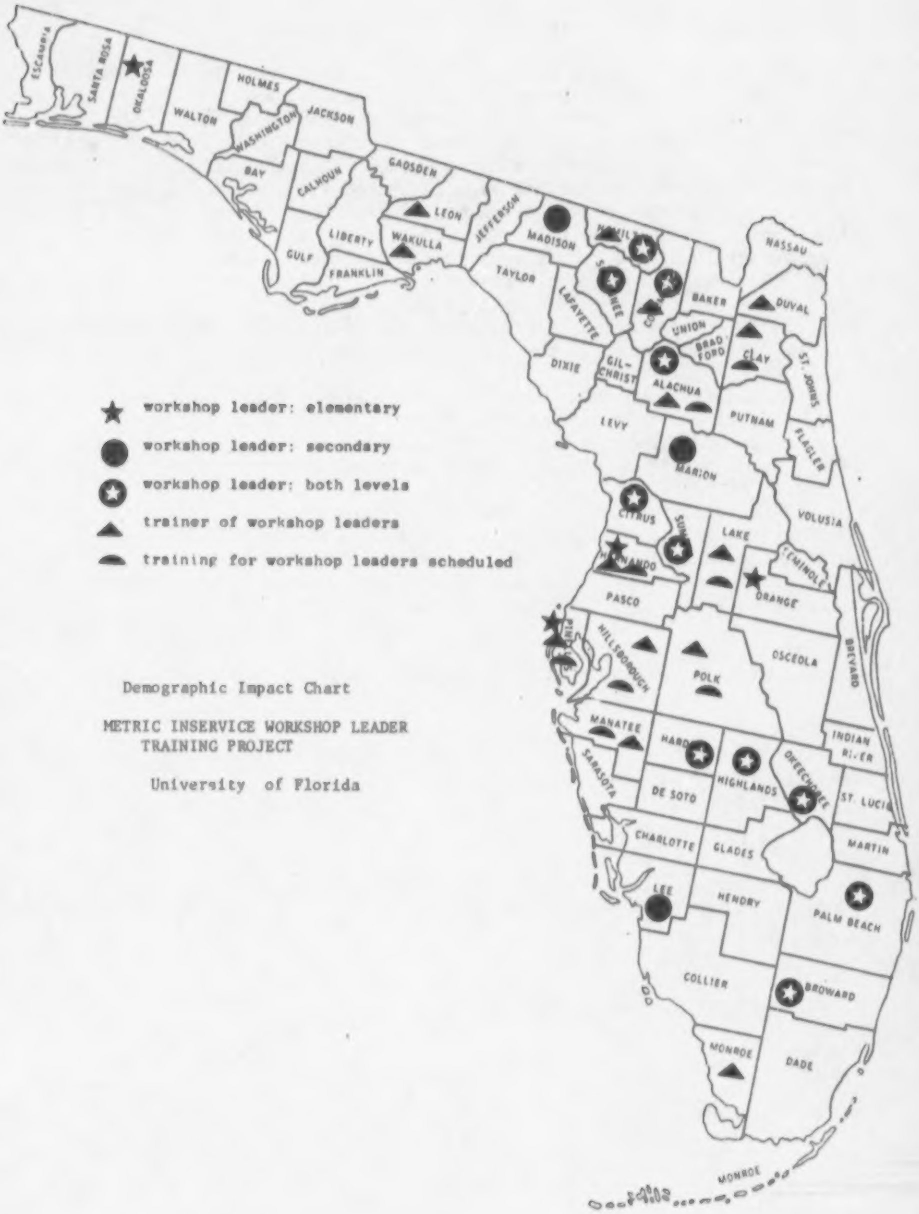
The system of rewards in the form of Federal grants to educational institutions as support for programs that prepare students to use the metric system have been very effective. Of all the Federal programs for which I have an experience-based knowledge, the Metric Education Program of the Office of Education has been laudable. This declaration of merit is made with regard to not only the excellent models and methods which have resulted from grant awards, but also in referance to the manner in which the grants have been administered in Washington. From evaluating proposals to facilitating dissemination of outcomes, the Metric Education Program staff has performed admirably.

"Change via the fear motivation technique has been one which Congress has sought to avoid. This avoidance is particularly evident from the tenor of the Metric Conversion Act of 1975." Although the policy of the United States is to coordinate and plan the increasing use of the metric system, it has been necessary for me to inform our citizens that the government has not mandated conversion. Thus the fear motivation exists, whether it is well-founded or not. It is also the case that many states have mandated, in some form, that all students in public school shall be taught the metric system. Fear, due to the lack of knowledge of the content, was initially expressed by students, teachers and parents. This fear was enlivened when several states included metric measurement skills on state assessment instruments, scores from which would determine graduation from high school. But due in a large part to the Metric Education Program, teachers and students throughout the nation have found not only higher achievement in metric skills but a genuine preference for the metric system over our traditional system of measurement. Thus the impact of the Metric Education Program has been one of changing fear into knowledge-based positive attitude.

At the present time, the effects of Metric Education Program grants long since expired are still being felt. For example, a metric inservice training project at the University of Florida was funded in 1979. The project sought to develop a program for training workshop leaders at the local school level to serve as metric resource persons. At the completion of the project, 23 elementary teachers and 20 secondary teachers had been trained. The Department of Education of the State of Florida adopted our model and materials for all schools in the state. At the present time over 600 trained workshop leaders are serving their schools. Based upon the average attendance at workshops previously held, approximately 8000 teachers in the State of Florida should benefit from the Federal project which cost a mere $27,000. I am certain that similar success stories are obtainable from other projects funded by the Metric Education Program.

As the Federal government phases out this highly successful program, I can only project pessimism with regard to future efforts in metric education. It is my recommendation that the Federal government, at least in some small way, continue to coordinate, disseminate and motivate efforts in metric education. The basis still exists for the position of Congress stated in the Metric Education Act of 1978, that "a Federal program is vitally necessary if the American people are to adapt to the use of the metric system of weights and measures." You are leaving metric education to the states with only the surface scratched in regard to what was leading us nearer to a metric America.

Again I thank you for this opportunity to share with you my perceptions. I am now available for any questions that you might have."



Demographic Impact Chart

METRIC INSERVICE WORKSHOP LEADER
TRAINING PROJECT

University of Florida

BIOGRAPHICAL SKETCH

JOHN W. GREGORY, PhD
Associate Professor
Mathematics Education
University of Florida
Gainesville, Florida

EDUCATION

Lebanon Valley College	Major: Mathematics	B.A.	June 1966
Wesleyan University	Major: Mathematics	M.A.T.	June 1968
Ohio State University	Major: Mathematics Education	Ph.D.	June 1972

EMPLOYMENT

Hartford Public High, CT	Math teacher; grade 9	2/67 - 6/67
Staples High School, CT	Math teacher; 10-12	9/67 - 6/70
Ohio State University, OH	Graduate research associate	9/70 - 6/72
University of Florida, FL	Associate Professor, math. ed.	9/72 - present

PUBLICATIONS (metric)

Gregory, J.W. & Bernard, D.H. Metric Inservice Guidebook - Elementary Level. Renaissance Publishing Co., 1979.

Gregory, J.W. & Bernard, D.H. Metric Inservice Guidebook - Secondary :eve;. Renaissance Publishing Co., 1979.

Gregory, John W. "Metric Dominoes with a Challenge." Arithmetic Teacher vol. 26, no. 8 (April 1979), pp. 635-638.

Gregory, John W. "Making Metric Calipers." School Science and Mathematics vol. LXXVII, no. 8 (December1977), pp.34-35.

GRANTS (metric)

Principal Investigator: Metric Inservice Workshop Leader Training Project. USOE Grant No. G007902646, July 1979 - December 1980, $27,669.

Principal Investigator: Metric Training and Materials. Florida State DOE, September - October 1980, $7,620.

MAJOR CONSULTANCIES (metric)

Near East/South Asia Consortium of American Schools (Greece, Pakistan and India); workshops and demonstration lessons in metric education and other k-12 mathematics topics, October - November 1981.

American Association for Advancement of Science, Washington, D.C.; mathematics materials reviewer for Science Books and Films, 1972 - present.

Griffin, Georgia Public Schools; workshops on measurement for basic skills, June 1978.

Creative Publications, Inc., Palo Alto, CA; staff editor of mathematics & metric materials; June - September 1976 and June - September 1977; materials development consultant, September 1977 - present.

Florida State Department of Education; staff consultant for metric inservice education, August - December 1980.

Florida Department of Education; workshop and training director for the State DOE Metric Conference, Gainesville, FL, October 1980.

Florida Metric Council; reviewer of the Metric Proposal/Star Grant, Metric Makes Cents, December 1981.

CC
Claremore College
College Hill
Claremore, Oklahoma 74017
918-341-7510

RECEIVED
FEB - 5 1982
COMMITTEE ON SCIENCE
AND TECHNOLOGY

January 29, 1982

Congressman Don Fuqua
Rayborn House Office Building
Room 2269
Washington, D.C. 20202

Dear Congressman Fuqua:

I am the Director of Metric Education for Northeastern Oklahoma working on a Federal Educational Grant #G008100199. First of all I want to thank you and express my appreciation for your support of metric education and the metrication of the United States. I feel it is vital for our nation to make the transition from our old measurement system to a modern day, scientific system. Our nation was built on advancement and freedom to change. This has made us the power we are today.

The metrication of the United States is a very important economical step, the change must take place for us to survive in the world trade market. Large exporters have come to this conclusion and have begun the transition to metric. Our economy could not stand a reversal of the Metric Act of 1975.

Metric Education is the key to metric conversion. This is why the Educational Metric Grants are such an important part of our educational system, without them metrication will fail. Through my experience, I've learned teachers are hesitant to teach metric because of their lack of knowledge and experience with it. By attending workshops they become familiar with the terms and units and can easily implement it in their classrooms.

Enclosed is the manual I developed for the metric workshops I present, also enclosed is a Cherokee Translation of the manual. Northeastern Oklahoma has a large population of Native Americans. We have tried to reach this targeted group with the manual in Cherokee and a Cherokee translated film produced two years ago by Lee Parish, the former Director of Metric Education of Northeastern Oklahoma.

You're doin' fine, Oklahoma!
75
1907 Diamond Jubilee 1982

"A Personal Kind of Education"

Metric exhibits have been set up at the county fairs and city shopping malls. Over 25,000 people walked through the exhibits. The response was excellent.

In-class workshops are offered for home economic teachers and their students. Through hands-on activities they receive practical usage of the metric system in the home and shopping. I also go into the classroom of elementary and junior high students to explain the metric system. In the past six months that I have had this position, over 1,050 people have been involved in either the four hour workshop or the awareness programs.

The Metric Educational Grants are a beneficial method of reaching the masses. They cannot be eliminated or forgotten when the states take control of the grant through the New Consolidation Act of 1981. We need more congressmen who realize the need for metric education and who will stand up and be counted.

Thank you for being a congressman who realizes the importance of metric education.

Sincerely,

Mrs Vicki Martin

Mrs. Vicki Martin
Director of Metric Education

VM/ba

A PREPARED STATEMENT
BY
VICTORIA C. MARTIN

Director of Metric Education
Northeastern Oklahoma 1981-1982
Metric Educational Grant #G008100199
U.S. Department of Education
Claremore College
Claremore, Oklahoma

Thank you for the opportunity to share my experience in Metric Education. I am the Director of Metric Education for Northeastern Oklahoma at Claremore College, Claremore, Oklahoma, working on a Federal Educational Grant #G008100199.

I feel it is vital for our nation to make the transition from our old system of measurement to a modern day, scientific system. Our nation was built on advancement and freedom to change. This has made us the power we are today.

The Metrication of the United States is a very important economical step, the change must take place in order for us to survive in the world market. Many countries have metric laws in effect which enforce penalties and in some cases jail sentences for improper labeling. In a paper presented to the United States Metric Association at their annual conference on October 2, 1981, Mr. E. James Tew, Jr., Manager of Quality Assurance of Texas Instruments, Incorporated, stated this very fact in his article Metric Requirements for Exporters. Mr. Tew also gave examples of recent notifications received by the United States concerning the regulation of labeling products exported to France, Germany and many other countries. Large exporters have realized that they must begin the transition to metric to survive in the world market.

Our economy could not stand a reversal of the Metric Conversion Act of 1975. Industries, exporters and businesses all over the country have begun the transition to metric. General Motors, Texas Instruments, Caterpillar, IBM and U.S. Steel are only a few large industries who have begun the move to metric. Outdated equipment is being replaced by new equipment in metric sizes. Millions of dollars have been spent on new metric products - - to reverse or halt the metrication of the United States could cause many companies to go bankrupt. This would only damage our economy.

METRIC EDUCATION IS THE KEY TO METRIC CONVERSION. This is why the educational metric grants are such an important part of our educational system; without them, metrication will fail. Metric education should be included in the school curriculum. The metric education our children are receiving today is very limited due to the fact that teachers are not comfortable with the metric measurements. Unless teachers were math majors, science majors or took it on their own initiative, they did not learn the metric system in college. Through my experience, I've learned teachers are hesitant to teach metric because of lack of knowledge and experience with it. By attending a workshop they become familiar with the terms and units and can easily implement it in their classrooms. According to my figures, there is an average competence increase of 32% in teachers who have completed the metric workshop.

The metric workshop is four hours in length. Three of the four hours involve hands-on activities which can be used in the classroom.

The teachers receive a manual, activity sheets, brochures, pamphlets, rulers and measuring tapes when they attend the workshop to better equip them in their classroom. METRIC EDUCATION BEGINS WITH METRIC EDUCATED TEACHERS . . . In-class workshops are offered for home economic teachers and their students. Through hands-on activities they receive practical usage of the metric system in the home and stores. They learn their metric clothing size, that comparison shopping is easier with metric units, recipe conversions and sewing with metric measurement. I also go into the classroom of elementary and junior high students to explain the metric system.

Metric education does not stop with the education of teachers. Northeastern Oklahoma has a large population of Native Americans. We have attempted to reach this targeted group with a manual translated in Cherokee and a Cherokee translated film. Both are used in the four hour workshop presented to the Northeastern Oklahoma Indian Field Clinics. They have been very successful and have produced in the targeted population a greater awareness and understanding of the metric units.

METRIC EDUCATION IS THROUGH METRIC AWARENESS. Metric exhibits have been set up at the county fairs and shopping malls. A metric week has been scheduled for the end of March. Metric Awareness Programs have been presented to various groups, clubs and schools in the area. The objective of these activities is to produce in the areas general public an awareness of the units, logic and function of the metric system. The response has been excellent and has stimulated many to continue their metric education. In the past six months that I have had this position, over 1,050 people have been involved in either the four hour workshop or the awareness programs. An additional 100 have been involved in the home economic in-class workshop with six more workshops to be completed. Over 25,000 people walked through the fairs and malls while the metric exhibit was on display.

The Metric Educational Grants are a beneficial method of reaching the masses. They cannot be eliminated or put aside when the states take control of the grants through the New Consolidation Act of 1981. We need more congressmen and senators who realize the need for metric education and who will stand up and be counted.

Thank you for your time and consideration in this matter. Let me express my gratitude for the opportunity to testify on my findings and experiences in Metric Education.

AWARENESS PROGRAMS

DATE	ORGANIZATION	NUMBER OF PEOPLE REACHED
September 1, 1981	Harmony Extension Homemakers	9
September 16, 1981	Claremore College Orientation Class	215
October 12, 1981	Broken Arrow Rotary Club	46
October 15, 1981	Holiday Hills Extension Homemakers	18
October 19, 1981	Beta Sigma Phi	21
October 20, 1981	Roosa Parent Teacher Organization	56
October 28, 1981	Brookside Lions Club	29
November 6, 1981	Chambers Extension Homemakers	18
November 11, 1981	Kiwanis Club - Utica Square	19
November 17, 1981	Nowata Extension Homemakers	22
November 18, 1981	American Business Womens Association	45
November 19, 1981	Inola Extension Homemakers	9
November 30, 1981	Kiwanis Club - Claremore	14
December 2, 1981	Claremore College Nursing Students	12
December 15, 1981	Brownie Troop #289	10
January 6, 1982	Limestone Extension Homemakers	12
January 14, 1982	Sequoyah Junior High	116
January 21, 1982	Sperry High School	77
January 25, 1982	Claremore College Orientation Class	35
January 27, 1982	Stuart Roosa Elementary School	22
January 28, 1982	Verdigris Junior High School	23
February 2, 1982	Boy Scout Troop #58	34
	TOTAL NUMBER OF PEOPLE REACHED	862

METRIC WORKSHOPS

Wagoner Workshop

Date: October 5 and 6, 1981

Time: 7:00 to 9:00 p.m.

People Who Attended	Pretest Score	Post Test Score	% Increase
Sunshine Ivy	10%	68%	58%
Gladys Robbins	32%	68%	36%
Jemolee Cole	39%	84%	45%
Linda Collins	81%	92%	11%
Betty Kerr	81%	88%	7%
Flora Sweeten	90%	92%	2%
Tuel D. Cole	71%	86%	15%
Karen Davison	52%	-	-
Jim Pratt	71%	-	-

Claremont Workshop

Date: October 5, 12, 19 and 26, 1981

Time: 3:30 to 4:30 p.m.

People Who Attended	Pretest Score	Post Test Score	% Increase
Judy Chadwell	84%	-	-
Barbara Jackson	74%	84%	10%
Winnie Rawson	33%	78%	45%
Sue Kelly	67%	-	-
LaJuanna Mack	3%	-	-
Gloria Coley	6%	-	-
Betty Dolina	19%	-	-

Bixby Workshop at C.E. Gray Elementary

Date: October 7 and 14, 1981

Time: 3:30 to 5:30 p.m.

People Who Attended	Pretest Score	Post Test Score	% Increase
Julia Brown	80%	94%	6%
Bonnie Rich	51%	84%	33%
Alice Gorbet	16%	78%	62%
Wanda Jones	35%	76%	41%
Karen Stubbs	61%	76%	15%

(Continuation of Bixby Workshop)

People Who Attended	Pretest Score	Post Test Score	% Increase
Lou Jeane Gimlin	39%	56%	17%
Wanda Kelchin	55%	74%	19%
Charlene Reynolds	51%	72%	21%
Lynda Wood	42%	66%	24%
Charlotte Cobb	48%	84%	36%
Janet Jones	16%	80%	64%
Nancy Lindeman	48%	78%	30%
Glenda Hudson	51%	88%	37%

Sperry Workshop

Date: October 20 & 22, 1981

Time: 3:15 to 5:00 p.m.

People Who Attended	Pretest Score	Post Test Score	% Increase
Susan Boone	26%	-	-
Linda Blackwell	55%	88%	33%
James Bryan	81%	88%	7%
Kathy Callaham	26%	-	-
Donna Carter	29%	-	-
Rebecca Cooper	81%	88%	7%
Martha Hughes	13%	80%	67%
Barbara Murn	42%	66%	24%
Jennifer Reamy	19%	64%	45%
Danny Webb	45%	80%	35%
Corinne Smith	-	78%	-

Sequoyah Workshop

Date: October 21 and 28 and November 4 and 11, 1981

Time: 3:30 to 4:30 p.m.

People Who Attended	Pretest Score	Post Test Score	% Increase
Ruth Carey	52%	-	-
Marilyn Koerner	45%	90%	45%
Velvet Ward	74%	88%	14%

Barnes Elementary Workshop in Owasso

Date: October 27 and November 3, 10 and 17, 1981

Time: 3:30 to 4:30 p.m.

People Who Attended	Pretest Score	Post Test Score	% Increase
Julie Bowline	94%	-	-
Jureta Cessna	45%	-	-
LaRene Davies	19%	-	-
Ervin Eastham	77%	-	-
Rayma Harchar	84%	84%	0%
Florence Hoff	32%	86%	54%
Clarabelle May	32%	50%	18%
Raymond May	61%	88%	27%
Sherry Stiles	52%	-	-
Barbara Thompson	16%	60%	44%

Wickliffe Elementary Workshop in Salina

Date: November 5 and 12, 1981

Time: 2:30 to 4:30 p.m.

People Who Attended	Pretest Score	Post Test Score	% Increase
Jackie DeCamp	42%	78%	36%
Connie Haley	51%	68%	17%
Pam Ingle	100%	92%	-8%
Patsy Ingle	35%	80%	45%
Linda Littledove	3%	-	-
Denise Mahan	32%	60%	28%
Brenda Neel	48%	36%	-12%
Terry Pierce	77%	92%	15%
Carolyn Ross	3%	32%	29%
Donna Weaver	55%	80%	25%
Barbara Wickliffe	0%	60%	60%
Dianna Scrapper	-	66%	-

Spavinaw Workshop

Date: November 16 and 23, 1981

Time: 9:00 to 11:00 a.m.

(Continuation of Spavinaw Workshop)

People Who Attended	Pretest Score	Post Test Score	% Increase
Sharon Drake	35%	-	-
Melinda James	45%	86%	41%
Carol Lundy	71%	90%	19%
Kennitha Webb	29%	-	-
Jesse Webb	77%	90%	13%
Wilma Wilson	39%	72%	33%

Tahlequah Indian Education Workshop

Date: November 20, 1981

Time: 9:00 a.m. to 3:00 p.m.

People Who Attended	Pretest Score	Post Test Score	% Increase
Linda Allen	6%	12%	6%
Nancy Cummings	13%	54%	41%
Annas Downing	13%	52%	39%
Durbin Feeling	45%	-	-
Charles Foster	65%	86%	21%
Rosie Flute	3%	56%	53%
Mose Killer	6%	-	-
Ann Pritchell	0%	38%	38%
Lou Anna Soap	19%	44%	25%
Juanita Stilwell	6%	64%	58%
Victor Vance	65%	82%	17%
Norma Baldridge	-	58%	-

Robertson Elementary Workshop

Date: December 2 and 9, 1981

Time: 3:30 to 5:30 p.m.

People Who Attended	Pretest Score	Post Test Score	% Increase
Annette Gathron	52%	82%	30%
Jennifer Willhite	26%	74%	48%

Lenapah Workshop

Date: January 11, 1982

Time: 10:00 a.m. to 2:30 p.m.

People Who Attended	Pretest Score	Post Test Score	% Increase
Joyce Bates	10%	78%	68%
Mary Stewart	13%	70%	57%
Doris Walton	6%	62%	56%
Jim Walton	13%	40%	27%
Sammie Woodson	10%	80%	70%

Wilson Elementary Workshop in Bartlesville

Date: January 19, 1982

Time: 3:30 to 5:30 p.m.

People Who Attended	Pretest Score	Post Test Score	% Increase
Kay Burpo	19%		
Patti Evans	45%	The Second Part of This Workshop was Cancelled	
Roz Flowers	48%		
Evelyn Hill	10%		
Kathy Phinney	58%		
Sylvia Wood	-		

Okmulgee Indian Dental Clinic

Date: January 15, 1982

Time: 1:00 to 5:00 p.m.

People Who Attended	Pretest Score	Post Test Score
John Candill	90%	94%
E. M. Perry	13%	58%
Jack Shannon	100%	100%
Pat Williams	10%	58%

Jay Indian Hospital

Date: January 8, 1982

Time: 8:30 a.m. to Noon

People Who Attended	Pretest Score	Post Test Score
Mary Arneecher	10%	78%
Margaret Ballard	42%	80%
Betty Birdsong	0%	0%
John Butler	0%	0%
Cynthia Buzzard	32%	80%
Linda Carpenter	58%	90%
Vickie Crawford	10%	54%
David Davis	3%	42%
Robert Girty	3%	32%
Carol Graham	26%	90%
Don Greenfeather	0%	70%
Mose Hair	0%	16%
Billie Lizz	45%	86%
Bill Mouse	0%	0%
Harriet Page	39%	82%
Brenda Ritz	42%	88%
Larry Sloan	0%	62%
Brenda Stogsdill	0%	82%
William Stover	0%	0%
Ruth Teel	16%	56%
Jeff Thompson	93%	100%

January 29, 1982

TO WHOM IT MAY CONCERN:

I am a junior high school math teacher at Sequoyah School. Because of my lack of knowledge about the Metric System of measurement, it was difficult for me to start teaching metrics to my students. However, it was brought to my attention that free workshops were being presented to interested teachers by Vicki Martin of Claremore College, Claremore, Oklahoma, who was working under a Federal Educational Grant. Mrs. Martin not only presented a metric workshop for interested teachers, but she also brought her equipment into the classroom so that the students could use hands on activities to familiarize themselves with the metric measurements. These workshops were very informative and the student interest greatly increased because of the information presented.

I feel that the metric workshops are very beneficial to the school system and that there are many teachers like me who are hesitant to teach the metric system because they are not adequately informed. I sincerely hope that this program will continue to be made available.

Sincerely,

Mrs Velvet Ward

Mrs. Velvet Ward
Math Teacher
Sequoyah Junior High School
Claremore, OK 74017

BIOGRAPHICAL STATEMENT
OF
VICTORIA CHRISTINE MARTIN

ADDRESS:	Route 9, Box 431 Claremore, Oklahoma 74017
TELEPHONE:	(918) 341-9190
DATE OF BIRTH:	July 10, 1948
MARITAL STATUS:	Married
CHILDREN:	David Martin, age 8 Timothy Martin, age 5

EDUCATIONAL BACKGROUND:

January, 1966	Graduated from Upland High School, Upland, California
June, 1968	Associate of Science Degree from Chaffey College, Alta Loma, California (Math Major)
June, 1972	Bachelor of Arts Degree from California State University at Northridge, Northridge, California (Sociology Major)

EXPERIENCE:

August, 1981 - Present

Director of Metric Education for Northeastern Oklahoma

Responsibilities - The administration of the Northeastern Oklahoma Metric Educational Program funded through a grant from the U.S. Office of Education.

- Coordinate and schedule workshops designed to teach the metric system
- Give speeches and programs for clubs and civic groups to increase awareness of the metric system
- Responsible for grant budget and records

June, 1972 to August, 1981

Responsible for family business records and accounts, the renting and management of rental property and the selling and buying of personal and rental property.

August, 1968 to June, 1972

Evening Assistant Manager at the Broadway Department Store, Montclair, California and Van Nuys, California

Responsibilities - PBX operation, Cashier, Relief in Accounting and Assistance in All Selling Departments.

Summer, 1969

Head Counselor at the Forrest Home Christian Camp, Forrest Falls, California

TESTIMONY
AS PROVIDED BY
SANDRA 7. MORELLI
FOR
THE COMMITTEE FOR SCIENCE & TECHNOLOGY
1982 FEBRUARY 08
OVERSIGHT HEARING
FOR
NATIONAL METRIC IMPLEMENTATION AND DEVELOPMENT

Most of the world is using the metric system of measurement. Large corporations are trading in the world market with metric commodities. With photography, tools, soft and hard beverages, automobiles, pharmaceuticals, and sports using metric units, New York is, and needs to continue preparing its students to live in a metric world.

The state model for our elementary mathematics syllabus makes predominant use of metric units in its total measurement sequence. The junior high and the high school syllabi are also being rewritten in correlation with this revision. Metric measures are used in the state testing programs for elementary and junior high mathematics and in the high school standardized exams for mathematics, science and business education. This increased use of metric units provides us with the chance to improve measurement instruction in general. The immediate difficulty we have encountered is two-fold. Elementary teachers, unfortunately, are fearful of this measurement system and, our traditional method of teaching measurement has proven less than successful. What, then, is our greatest need? Teacher in-service education in metric measurement instruction.

The United States Metric Education Program (Department of Education) has been a great help to New York State. Since 1975, this program has provided some funding to the New York State Education Department and to a small group of public school districts. New York State (along with eight other Northeastern states) was involved in a Northeastern Regional Metric Consortium, funded by this same federal program, which developed curriculum materials with teacher guides, parent metric awareness kits, and a regional metric implementation plan. We also surveyed state certification regulations for teachers and examined the guidelines for pre-service and in-service education for teachers in metric education.

As manager of one of these federally funded projects, I have been providing in-service training to administrators, teacher leaders, and Weights and Measures Officials for the past three years. This program, the New York State Metric Education Project, has provided these services in three of the six geographical regions of New York State. We have three more regions to cover to complete our task.

Previous to this program, we surveyed existing metric projects throughout the nation and the metrication needs of the 736 public school districts in New York State. Each district needed readily available resource individuals on whom they could rely as total district metric plans developed to include teacher training, curriculum development, instructional resource acquisition, parent and community awareness, and administrative monitoring systems. With the limited funds available, we decided on a multiplier strategy. (See chart I) I trained selected representatives from each school district in an intensive course so that these representatives could in turn train others in their district.

These "Metric Teacher Leaders" act as metric advocates for their local school districts. They assist district administrators in developing metric implementation plans, conducting teacher awareness workshops, leading in-service courses in measurement instruction, and conducting parent and community group metric awareness presentations. They also act as measurement resource specialists to assist in the review and selection of appropriate supplies and materials for measurement instruction and in the development of curricular revisions in regard to metric measurement. The teacher leaders were selected from various areas of instructional expertise, including, the elementary classroom, reading specialists, secondary mathematics and science teachers, Title I coordinators, curriculum coordinators, and administrators. We evaluated the school administrators for their knowledge of district-wide metric implementation factors and tested teacher leaders and their trainees for metric knowledge and metric implementation attitudes. (See chart II)

In evaluating the effectiveness of this program, it is evident that, while much has been accomplished in a relatively short period with limited funds, we still have many 'kilometers to go' before we have completed our goal. The combined efforts of projects funded by the federal government through the 1974 Metric Education Act, projects funded by the Elementary and Secondary Education Act (Title IV-C), and local district funding have only impacted a little over 40% of the total school districts in New York State (See chart III).

Further analysis of this approach to teacher training demonstrates a highly cost effective system (See chart IV). Even if one assumes a per student cost of teacher training at $5.00, the additional cost of a pre-developed curriculum package would not raise the cost to higher than $10.00 per student. This seems to be a small price to pay for a major curriculum change.

The United States Metric Education Program also allowed us to provide training to New York State's Weights and Measures Officials in each of the regions funded. These officials were given training in metric competency, consumer and industrial issues, tolerance, precision, packaging, and techniques for providing community metric awareness programs. Community and consumer awareness has been further planned through the development of television and radio public service announcements which provide familiarity with basic metric concepts.

Administrators and teachers see the educational need for metric instruction. A similar attitude is not shared by many community members. Because of their encounter in every day life with conflicting systems of measurement, parents and other adults see only hesitancy on the part of the United States in making a consistent decision on a measurement policy. This skepticism reduces educational enthusiasm about any metric program since, as one administrator phrased it, "The United States Government really doesn't seem to be backing this thing".

Therefore, Government, Education, Industry and Community must all cooperate in working towards a logical and consistent goal. I would like to recommend that:

-All governmental agencies be guided on a sensible cost effective timeline for metrication.

-The U.S. Metric Board be supplied with more effective resources with which it may establish and implement a consumer sector timeline.

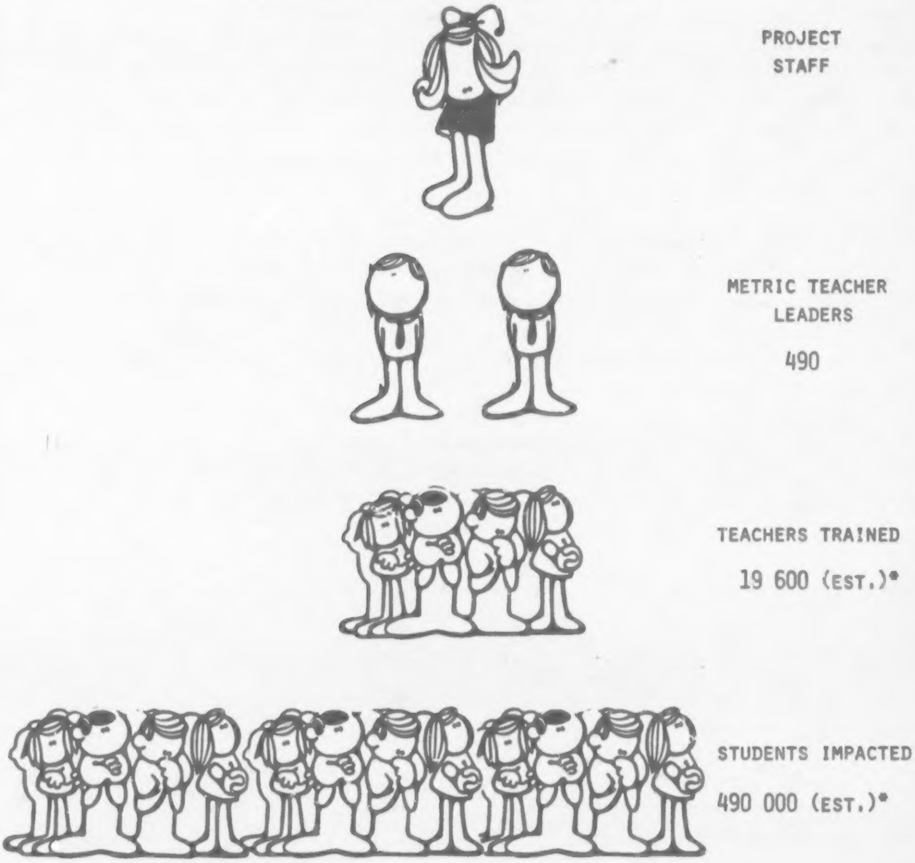
-More support be provided to school metrication programs so that all states can continue in reaching an organized goal for metric instruction.

-Since there are enough successful metric curriculum programs available (especially at the elementary level), any new money for metric education should be earmarked for training and dissemination.

Thank you.

CHART I

MULTIPLIER STRATEGY
OF THE
NEW YORK STATE METRIC EDUCATION PROJECT



* Note: This data is projected since the longitudinal study is not scheduled to be completed until 1982 July.

CHART II

AREAS IN WHICH
NEW YORK STATE METRIC EDUCATION PROJECT
MADE A SIGNIFICANT
STATISTICAL DIFFERENCE

ADMINISTRATORS

-DEVELOPING A STAFF TRAINING PROGRAM.
-IMPLEMENTING A STAFF TRAINING PROGRAM.
-DEVELOPING PLANS FOR METRIC RESOURCE ACQUISITION.
-DEVELOPING AN OVERALL IMPLEMENTATION TIME LINE.

TEACHER LEADERS

-IMPROVING MEASUREMENT SKILLS USING METRIC UNITS.
-IMPROVING KNOWLEDGE OF APPROPRIATE METRIC STYLE GUIDELINES.
-IMPROVING AWARENESS OF MEASUREMENT INSTRUCTIONAL STRATEGIES.
-IMPROVING ATTITUDE TOWARDS METRIC IMPLEMENTATION.

TRAINEES

-IMPROVING MEASUREMENT SKILLS USING METRIC UNITS.
-IMPROVING KNOWLEDGE OF APPROPRIATE METRIC STYLE GUIDELINES.
-IMPROVING ATTITUDE TOWARDS METRIC IMPLEMENTATION.

CHART III

NEW YORK STATE SCHOOLS RECEIVING METRIC EDUCATION ASSISTANCE

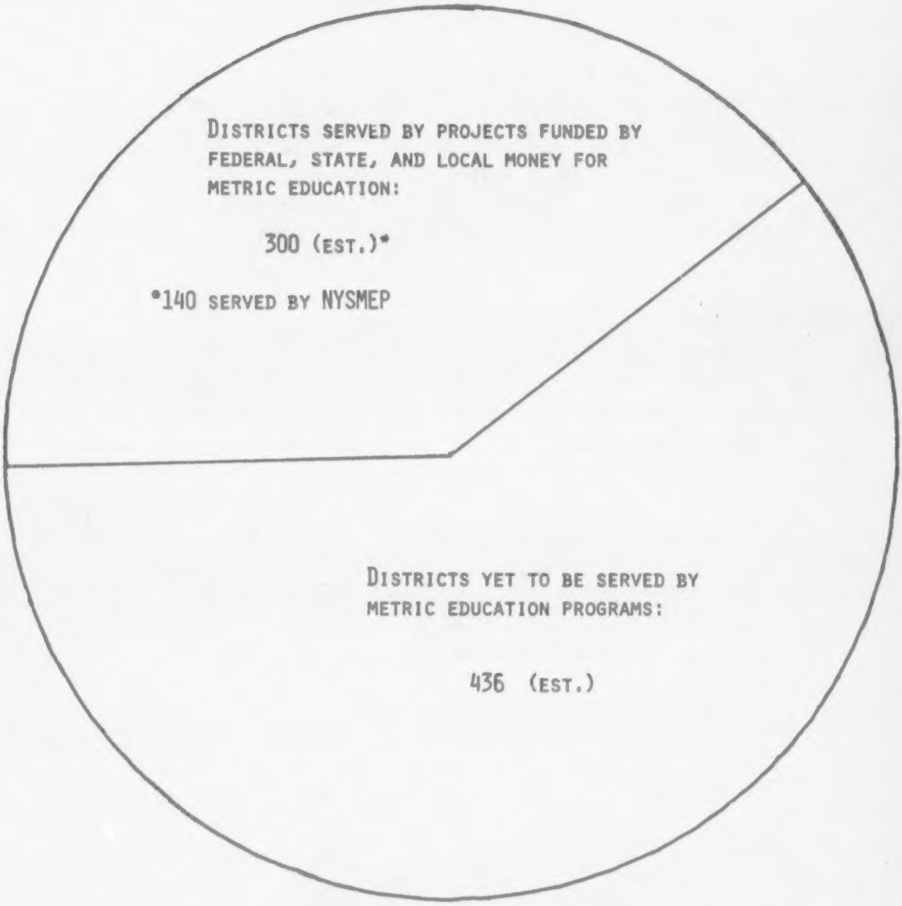


CHART IV

COST EFFECTIVENESS
OF
METRIC TEACHER TRAINING

FEDERAL FUNDING TO NEW YORK STATE METRIC EDUCATION PROJECT

1979-80		1980-81		1981-82		
$39 998	+	$63 129	+	$41 820	=	$ 144 947

LOCAL COST OF TEACHER LEADER TRAINING

490 TEACHER LEADERS X $45 PER DAY (EST.) X 4 DAYS = 88 200

LOCAL FUNDING FOR TRAINING OTHER TEACHERS

19 600 TEACHER TRAINED X $90 PER DAY (EST.) = 1 764 000

TOTAL COST OF TEACHER TRAINING $1 997 147

NUMBER OF STUDENTS

490 TEACHER LEADERS X 40 TEACHERS (EST.) X 25 STUDENTS (EST.) = 490 000

COST PER STUDENT

$1 997 147 (TOTAL COST OF TEACHER TRAINING) ÷ 490 000 STUDENTS (EST.) = $4.08

Biographical Sketch

Name: Sandra Z. Morelli

Position:
Metric Education Specialist (3 years)
New York State Education Department

Address:
New York State Metric Education Program
c/o Monroe #2-Orleans Board of Cooperative Educational Services
3599 Big Ridge Road
Spencerport, New York 14559
(716) 352-2406

Education:

K-12 Utica City Schools
Utica, New York

BA NYS University College at New Paltz
New Paltz, New York
Field: Mathematics Education

MS Syracuse University
Syracuse, New York
Field: Mathematics Education

Certification:
Nursery - Grade 6: Elementary Education (New York State)
Grade 7 - Grade 12: Mathematics Education (New York State)
School Administrator and Supervisor (New York State)

Employment History:

Metric Project Coordinator
Cortland-Madison Board of Cooperative Educational Services
Cortland, New York

Mathematics Teacher (7.5 years)
Fabius, New York
Utica, New York

Publications/ Productions:

Public Service Announcements: Metric Information Series, 30-second video spots for distribution to New York State television stations, 1981-82.

Association of Mathematics Teachers of New York State, "A Position Statement on Metric Measurement", Committee Membership, 1981.

Morelli, Sandra Z. and Borelli, Michael L., "Teaching Measurement to Children: Grade K-6", 1978. Guide listed in Educational Resources Information Center (ERIC).

Consultant: New York State Bureau of Weights and Measures; Keuka College; Los Angeles Unified School District; Project MEASURE (ESEA Title IV-C); Comprehensive Metric Education Project, Syracuse University.

Professional Memberships:
Association of Mathematics Teachers of New York State
National Council of Teachers of Mathematics
New York State Association of Math Supervisors (Secretary, 1980-1982)
U.S. Metric Association

Conference Speaker: U.S. Department of Education Annual National Metric Conference (1981); AMTNYS Summer Conference (1981); AMTRA Conference (1981); NCTM Conference (N.E., 1980); AMTNYS Conference (1981, 1980, 1978).

BETHEL PARK SCHOOL DISTRICT
301 CHURCH ROAD
BETHEL PARK, PENNSYLVANIA 15102
TELEPHONE: 833-5000

PROJECT: MOBILE METRIC GRANT # G008100194

DIRECTOR: ROBERT SHORT, 412-833-5000 ext. 661

I am pleased to have this opportunity to convey to you the experiences I have received while working on this Metric Project (Grant # 008100194). Bethel Park School District applied for the grant after receiving the results of two different needs assessments. In the first, Math scores on metric and non-metric items from the Pennsylvania Educational Quality Assessment test were analyzed. Analysis showed that the tested students performed significantly lower on metric items than non-metric. Elementary teachers in Bethel Park were surveyed. Eighty-three percent of the teachers responding indicated that they wanted additional metric experiences.

With these needs in mind, and the grant awarded, the project began over the summer of 1981. The foremost question in my mind, as Project Director, was; how could I develop this grant to best service the teachers, students and eventually the community to think metrically? The question was answered by first conducting an intense inservice program for a select group of teachers who now serve as building leaders and metric resource people. This select group then inserviced the other teachers. Secondly, a Mobile Metric Classroom was created from a school bus and outfitting it with various metric manipulatives and visual aids. This Metric Bus will go from school to school to service the students. The bus will house fifteen students at a time. The course of study to be conducted on the bus will be individualized to meet the needs of each student. And finally, the development of an individualized course of study for the students. This course of study is based upon existing District Science and Math objectives, as well as many ideas and materials developed by other metric projects, past and present. It has been my responsibility to develop the resources to accomplish these goals.

The evaluation design of the project will measure two components, the process objectives and the performance objectives. The evaluation will be developed and implemented by the Metric Education Department of Pennsylvania State University which is under the direction of Dr. Cecil Trueblood. This project has been operating with a second goal as well, and that is to involve as many people as possible. This goal partially has been accomplished by involving District high school students. The Business Education Department has typed the activities and worksheets that serve as the course of study on the bus. The Graphic Arts Department is presetly printing gameboards that are used on the bus. They have also offered to print awards to be issued at the project's end. The Math Department has created programs for the micro computer that is used on the bus. The Physics Department is sending students to the bus to aid the younger students with their metric experiences. The Technical Training School of McKees Rocks, where some of the Bethel Park Students attend, aided in the renovation of the bus by installing seats, cabinets, and electrical wiring. The Bethel Park Media Center has offered to make at least one Television program to be broadcast on the local cable television station. The Elementary Schools Physical Education Department had offered to prepare athletes for a Metric Olympics to be held in May. The Elementary Music Department will participate in the Metric Olympics by playing the National Anthem and other selections. The Elementary Arts Department will participate by encouraging students to make uniforms and posters for the Metric Olympics. With all these students involved in the Mobile Metric Project, Bethel Park is receiving a Metric Blitz this year.

As this project concludes, it will leave these legacies:

1. 135 teachers inserviced in metrics.
2. A cadre of 24 teachers with extensive inservice training.
3. 3000 plus students directly effected by their teachers and the workings of Mobile Metric.
4. A teacher's activity book for each classroom.
5. Metric Manipulative equipment and a micro computer with Metric computer software.
6. Coordination of high school and elementary school students in a joint metric effort.
7. The idea of a district-wide annual metric olympics.
8. The use of cable TV to promote metric community awareness.
9. A reconstructed bus with a newly designed and tested metric course of study for elementary students.

It has been an important goal to involve the school and community, because this project is striving not to lecture on metrics but to get people thinking metrically. The bus will do that by creating an informal atmosphere where the children of today will begin to perceive and understand the metric system painlessly!

Let me express my gratitude for letting me report on the Bethel Park School District's attempt to further metricate the students and community.

I am available for questioning if the need arises.

VITA

My name is Robert H. Short II. I am a native to the Pittsburgh area. I reside in the suburb of Library, Pennsylvania with my wife and two small boys. I am currently a Project Director for a Metric Grant G008100194 within the Bethel Park School District.

I received my B.S. undergraduate degree at Edinboro State College in 1973. I continued my education by completing a Masters program in Elementary Science at the University of Pittsburgh in 1977.

I have been employed by the Bethel Park School District for eight years. Seven of those years were spent as a fifth grade classroom teacher. During which time I taught Departmental Science for five years and Math for two. Also during these years I have served on a Science Committee which developed curriculum and reorganized the science program. I have also engaged in several extra curricular activities, acting as coach or manager to all age groups of elementary students.

My present position, as Director of "Project Mobile Metric", has been an intriguing one.

I was appointed to this position in June of 1981. Since then I have made numerous contacts with fellow educators, metric projects, local businesses and industries sharing ideas concerning the enhancement of this metric project.

January 29, 1982

TO WHOM IT MAY CONCERN:

I am a junior high school math teacher at Sequoyah School. Because of my lack of knowledge about the Metric System of measurement, it was difficult for me to start teaching metrics to my students. However, it was brought to my attention that free workshops were being presented to interested teachers by Vicki Martin of Claremore College, Claremore, Oklahoma, who was working under a Federal Educational Grant. Mrs. Martin not only presented a metric workshop for interested teachers, but she also brought her equipment into the classroom so that the students could use hands on activities to familiarize themselves with the metric measurements. These workshops were very informative and the student interest greatly increased because of the information presented.

I feel that the metric workshops are very beneficial to the school system and that there are many teachers like me who are hesitant to teach the metric system because they are not adequately informed. I sincerely hope that this program will continue to be made available.

Sincerely,

Mrs Velvet Ward

Mrs. Velvet Ward
Math Teacher
Sequoyah Junior High School
Claremore, OK 74017

Carolene Wu
TARESA METRIC PROGRAM
Huntsville, Alabama

Statement

on the

Top of Alabama Regional Education Service Agency's Metric Education Program

The Top of Alabama Regional Education Service Agency (TARESA) serves eight largely rural school systems (Arab, Athens, Fort Payne, and Guntersville Cities, Limestone, Jackson, Madison, and Marshall Counties) in five counties of northeastern Alabama. TARESA was established to provide cost effective educational services on a regional basis which would be difficult or impossible for smaller school systems to offer on their own. The TARESA Board of Directors is composed of the eight superintendents of the eight school systems in TARESA. There are approximately 44,000 students and 1,000 teachers in the schools of the TARESA region.

The City of Huntsville is the center of the TARESA region. Huntsville is known as the Space Capitol of the World. It has the well-known George C. Marshall Space Flight Center and the Army Missile Command in its boundaries. The people are cosmopolitan-minded and receptive to progress. Theis includes consideration of the metric system. A summary of some of the activities in metrics in the Huntsville and surrounding areas are:

1. The MSFC has been active in metrics since about 1960. An extensive metric bibliography was compiled in 1976 with 7600 references. MSFC has run metric pilot efforts and regularly had displays for the National Metric Week. (For information contact Mr. John Aberg at (205) 453-4577). The MSFC has been active in the development of engineering standards in metric for the aerospace industry. During 1971-72 the MSFC conducted an intensive metric awareness campaign.
2. The U. S. Missile Command was selected in 1974 for location of a Defense-Industry Metrication Workshop because "it was ahead of the other installations". Their library-Redstone Scientific Info Center-has a large collection of "metric" books, painstakingly collected for over twenty years, along with books on

international engineering standards (metric).

3. The University of Alabama in Huntsville and A & M University have also been active in metric for about twenty years with:
    a. A Regional Metric Conference: Think Metric-Let Us Keep Ahead on January 27, 1977.
    b. Participation in metric film showings.
    c. Establishment of a Metric Information Office. It serves industry, exporters, scientists, manufacturers, and educators. It subscribes to several domestic and foreign metric periodicals.
4. Metric Trade and Industry
    a. Active participation in Chamber of Commerce International Roundtable Conference (Exporters' Forum)
    b. Metric Speed Limit Signs in Huntsville installed in 1971 (285 each)
    c. Metric Industries in the area
        1) Bruderer and Co.- a Swiss firm making presses
        2) ONAN Corp.-making "metric" diesel engines
        3) SCI Corp.-making electronic equipment for exportation
5. Metric Education
    a. TARESA Metric Education Programs (1976-78 and 1981-82)
        1) Sixty-nine elementary and eight adult education teachers have been trained in a five hour introductory workshop with Dr. C. J. Daane, Metric Specialist, from the University of Alabama in Tuscaloosa conducting the workshops. From these teachers have been chosen 24 key elementary and eight adult education teachers who are in the process of training teachers in their schools. The key teachers have attended a second five hour workshop in which they have made metric games and activities for use in their classroom and for training other teachers.

2) Each key teacher will spend time preparing and presenting a Metric Fair or Metric Week Activities. Teachers will provide an opportunity for their pupils to participate in the Metric Fair.

3) Each teacher will teach the metric system in his/her classroom for at least 12 hours.

4) The University of Alabama in Huntsville's Metric Information Office provides information and reference materials as well as assists teachers in obtaining metric films for use in their classrooms. Mr. Ernst Lange, Director of the Center, provides assistance to the TARESA Metric Program such as ordering materials, developing the metric curriculum guide as well as many other forms of assistance.

5) Each teacher is developing at least five metric lesson plans.

6) Each workshop participant received a metric folder which included information on ordering free and inexpensive metric materials, a metric ruler, thermometer, tape measure, conversion card, metricube, and many other booklets and information on the SI Metric System.

7) Each key teacher will receive a metric kit which will include:
   a) 30 sets of a metric game
   b) 5 colored folders for making games
   c) Instructions for making 15 metric games
   d) Liter volume Cube
   e) 35 20 cm rulers
   f) 10 metric measuring tapes
   g) 4 Celsius thermometers
   h) 50 centimeter cubes
   i) Plastic stacking masses
   j) The book Thinking Metric-second Edition A Self-Teaching Guide by Thomas F. Gilbert and Marilyn B. Gilbert

8) Each of the sixty-two elementary schools have been able to order $25.00 worth of metric supplies.

9) Each school system in the TARESA region will receive a Metric Kit which will include:

   a) Ten metric games
   b) Balance Scales with Weights
   c) Celsius Thermometer (a dozen)
   d) Measuring tapes (ten)
   e) Thiry-five 20 cm rulers
   f) Metric Graduated Cylinders
   g) Metric Plastic Stacking Masses
   h) Liter Volume Cube
   i) Kilogram Personal Scale
   j) Metric Units for Everyday Use Poster
   k) The book- Thinking Metric second edition A Self-Teaching Guide by Thomas F. Gilbert and Marilyn B. Gilbert
   l) Trianguler Meter Stick

10) The TARESA Metric Program is sponsoring a Metric Poster Contest for National Metric Week

b. UAH courses for secretaries, designers and the general public

c. A metric course at the Senior Center

d. A and M University courses for Early Childhood Education

e. Science fairs

Future Plans

Trying to get pilot projects such as the following to Huntsville:

1. Build a "metric" house
2. Utility meters in m^3 recording instead of gallons and $feet^3$
3. Get foreign industry to TARESA area (Korea, Japan, Germany, and Denmark). These industries work in metric.

4. Try to metricate hospitals such as Fox Hospital on Redstone Arsenal
5. Try to get furniture manufacturers to go metric

Continued effort to:

1. Stress the importance of going metric
2. Emphasize the benefits and opportunities of going metric for:
    a. exporters
    b. small businesses
    c. science and space work
3. Emphasize the time saved by learning the metric system and that there is less chance for errors
4. Emphasize the higher productivity (about 10%) which can be obtained through the use of the metric system ("inflation fighter")
5. Emphasize that it only cost General Motors 1% of the estimated cost for conversion to actually convert
6. Introduce the correct spelling of the SI Metric System in books, reports, to the media
7. Stress the universality of the metric system- a "world-wide" language!
8. Help small businesses in metric conversion. The small businesses do not normally have the background and resources to convert to metric on their own.

Problems

The Federal Government should increase its involvement in metrication. "Put teeth in the Metric Bill." Slow metrication is too costly!

Thank you Mr. Chairman for the opportunity to address this legislative session.

Carolene Wu, Director
TARESA Metric Program

Statement of
Gisele Charron Zangari, Project Director
PROJECT M^3 - MAKE MANSFIELD METRIC
Mansfield, Massachusetts

NATIONAL PERSPECTIVE

The United States is rapidly being caught up in the metric changeover and it is now necessary to have some knowledge of this system. Metric measures are being used more and more in phases of daily life.

The "customary" system of measurement in our country is obsolete and fast becoming a handicap in world affairs, both economic and political. The United States is the only industrial country not using the Metric System, yet it must only use metric measures in international endeavors. This puts the United States at a great disadvantage especially in cost effectiveness.

The media does not use metric implementation as a highlight as often because metric implementation has past its "awareness stage" and is presently in the actual "skill implementation stage". Of the top 1,000 major manufacturers and industries in the United States more than 85% are metric and are converting to the Metric System. Grocery stores are full of metric labelled packages. Levi Strauss put metric labels on its boys pants. Dress patterns are in metric measurements. Even metric recipes are becoming familiar. The question is no longer "is the United States going to convert to the metric system" but rather "how can education best be utilized to develop metric proficiency for the people."

Educators have the greatest responsibility in developing metric skills and proficiency throughout the nation. Many excellent and sound metric education projects have been developed through the Metric Education Program. Now, is the time to unify these programs and develop with these projects a national metric educational program.

Education is responsible for sharing metric pilots, objectives, and results. Education is responsible for sharing metric textbooks and materials developed as well as all information refering to metric status in the United States. Education is responsible for the dissemination of ideas and strategies for metric instruction. Education is responsible for providing a forum to share metric models for in-service and for sharing reports on its progress on a national, state, and local level. Education is responsible to provide a joint and unified effort to include metrification in multi-disciplinary content areas.

In summary Education is responsible for the metric needs of the nation! Educators are the closest to the public by their continuous repore with the children and their parents. Metrics should be a part of each education discipline and experience. Therefore it is the responsibility of educators to make the metric changeover as easy and complete as possible.

PROJECT M^3 - MAKE MANSFIELD METRIC

Mansfield is located in southeastern Massachusetts, the population is 14,200. A faculty of 240 and a student body of 3,300 exists in Mansfield. A great factor contributing to the success of Project M^3 is Mansfield's most cooperative administrative staff including Mr. J. Spencer Kelley, Mr. Edward Rosa, Mr. William DeStefano, Dr. John Gorman, and Mr. Robert Barbarisi.

Rapid international industrial growth has recently been experienced in Mansfield with such companies as Texas Instruments, Datsun, and the Foxboro Company. As a result, the educational staff became sensitive to the metric needs of the community.

Project M^3 was designed to provide a smooth and effective transition to metrication by reaching out to every member of the community: administration, faculty, students, adults as well as members of local business and industry through structured experiences to stimulate both an awareness of and a proficiency in the metric system.

In the spring of 1978 the proposal was accepted. Mansfield felt a definite need to develop a realistic and individualized program in teacher-in-service, 3rd grade pilot, home economics, industrial arts, and adult education.

The first task was to organize a core resource team who would participate in a summer workshop. Here the resource team would acquire the expertise that would enable them to supply the educational support services to carry out the objectives of the projects first year. This was achieved through a summer workshop. The workshop was divided into two areas of activity; a morning session taught by a university professor and an afternoon session where metric curricula was developed.

The home economics program was developed solely utilizing the metric system of measurement. This enabled the student to function effectively in a metric environment both in the preparation of food and in the manufacturing of clothing.

The industrial arts program provided the technical drawing student and the metal shop student with the initial phase-in of metric education. The technical drawing student would develop the metric blueprint and the metal shop student would fabricate the tools using these blueprints thus providing the student with the necessary metric skills needed in local industry.

In the spring of 1979 Project M^3 Phase II was funded. Phase II further developed metrication implementation by extending services to the neighboring towns of Easton, Foxboro, and Norton.

Pilots were developed for the 1st, 4th, 7th, the industrial arts pilot was developed for the 11th grade, and a pilot was developed for the business department.

The business pilot provided an introduction to metrics so as to enable the student to function effectively in a metric environment and it provided the student with the initial experiences leading to the skill mastery needed in using metric business equipment.

In the fall of 1980 Phase III was approved. Mansfield extended its services of metric implementation to the committee in southeastern Massachusetts.

A major intent of the grant was to increase the availability of the accumulated and acquired metric resources for a broader segment of the community by establishing a centralized metric resource area in the town library. Flexible metric programs were developed to help the metric consumer public become aware and competent with SI metrics.

Pilots were also developed in the 2nd, 5th, and 8th grade projects, an Industrial Arts and a Business Type III and Adult Education workshops entitled: Metrics - General Session, Metrics In and Around the Home, Metrics and the Consumer, Metrics and the Car, and Home Metrics.

The project has been disseminated through several radio interviews, guest speaking at various civic activities, and through a series of articles published in the newspaper.

In general all curricula in Mansfield now has the metric system of measurement thoroughly incorporated in its K-12 curricula. The people of Mansfield and its neighboring towns think Metric!

A great contributing factor to the success of Project M^3 Make Mansfield Metric is the devotion and timeless cooperation of the Massachusetts Metric Contact Person, Mr. Richard Carbone and the National Metric Program Director, Dr. Floyd Davis. A list of the existing Mansfield metric resource team is included with this report.

In conclusion, the cost per capita of the project is $ 1.94 per year. Project M^3 was a complete success and most cost effective.

Project M^3 Phase III Resource Team

ADULT LIBRARY PILOT

Brian Barnes
Debbie Gibson
Ed Harsch
Linda Keene
Gretchen Maurer

SECOND GRADE PILOT

Vi Balfour
Mim Darling
Donna Silkie
Vivian Sweet
Louise Waryas

FIFTH GRADE PILOT

John DiVerti
John Reagan
Gil Simmons

EIGTH GRADE PILOT

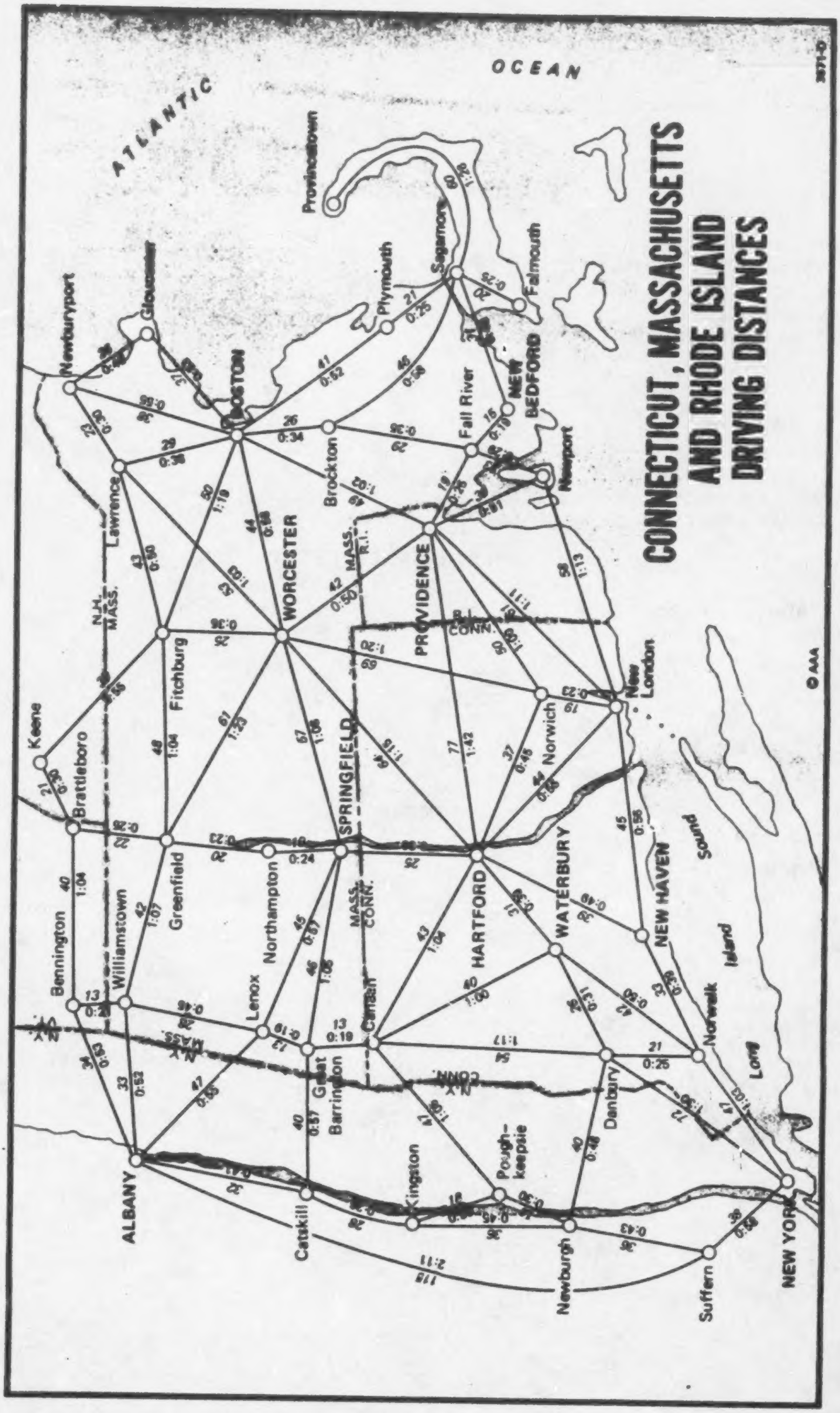
Dick Ruddick
Gisele Zangari

BUSINESS PILOT

Joan Proulx

INDUSTRIAL ARTS PILOT

Al Goetz



CONNECTICUT, MASSACHUSETTS AND RHODE ISLAND DRIVING DISTANCES

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APPLICATION ABSTRACT

Metric Education Program -- 13.561

Agency Title:

Mansfield Public Schools

Funds Requested: $ 33,030

Address:

P. O. Box 428, East Street
Mansfield, Massachusetts 02048

Metric Resolution

a) State Legislative yes ( ) no ( )
b) State Education Agency yes ( ) no ( )

Project Director:

Name : Gisele Zangari
Title : Project Director Phase I & II and Mathematics Teacher
Telephone Number: Area Code 617-229-8911

Project Title:

Project M^3 - Make Mansfield Metric Phase III

Numerical Profile of the Learner Population:

a) elementary : 1535 (K-5)
b) secondary : 1752
c) college/university:
d) teachers/teacher trainings: 243
e) other parents and adults : 13,000

Number of Direct Participants:

(1) Twenty-one members of Metric Resource Committee
(2) Two Hundred Forty-three members of the faculty of Mansfield School System
(3) 125 Parents
(4) Forty second grade students, fifty fourth grade students & seventy-two eighth grade students
(5) Three Hundred Sixty-five Industrial Arts and Business students.

Number to Benefit from a Spin-off or Multiplier Strategy:

(1) 655 Faculty members of neighboring collaborative towns of Easton, Foxboro and Norton
(2) 15,000 adult & parents of the Easton, Foxboro, Mansfield and Norton communities

Evidence of Need for the Proposed Project:

The town of Mansfield has recently experienced an increased growth in the area of industrial development. Many of the local industries and businesses now utilize the SI metric system. In 1977 a metric committee was established by the Mansfield School Committee for the purpose of providing direction for the implementation of a total changeover to SI Metrics. The plan was accepted by the school committee, but was tabled due to a lack of funds.

RESUME

NAME: Gisele Charron Zangari

ADDRESS: 21 Carlson Drive, Cumberland R.I. 02864

TELEPHONE: 1-(401) 724-8720

PERMANENT ADDRESS: Same

EDUCATION:

Dates Attended	College	Course Persued	Degree Awarded
1969 - 1973	Rhode Island College	Mathematics Major	B.A. Jan.'73
1974 - 1978	Rhode Island College	French Minor Graduate Mathematics Educ.	M.E.D.June '78
1981-Present	Univ. of Massachusetts	Doctoral Educational Administrator	

EXPERIENCE:

10/70 - 73 Rhode Island College, Providence R.I.
Tutor and Clerical assistant
Job description: Tutoring Algebra and Trigonometry and clerical aid in Mathematics Department

2/73 - Present Mansfield High School, Mansfield, MA.
Mathematics Teacher
Job description: Teach various topics in mathematics at secondary level including computer programming, geometry and consumer mathematics.
Teaching licenses received: Secondary Mathematics, Secondary French, and Secondary Administration.

EDUCATIONAL LEADERSHIP

Yearbook advisor for 1976, 1977, 1978 and 1982
Junior Class Advisor and Senior Class Advisor
Member of the Steering Committee for School Accreditation
Metric Project Director K-12 of Project M^3- Make Mansfield Metric Phase I, Phase II, and Phase III.

METRIC EXPERIENCE

Member of the Metric Committee for the Mansfield School System in 1976. In 1977, 1978, 1979 and 1980 a member of the committee that developed the Federal Project entitled "Project M^3". In 1978, 1979 and 1980 was the chairperson of the development of the Metric grant.
Graduate studies dealing with metrication: History of Mathematics, Secondary Methods of Education, Individualization Workshop, Current Problems in Education and Research in Education a two semester course. As previously mentioned Project Director for Project M^3 Phase I, Phase II and Phase III. Conducted workshop at National Metric Conference in Providence R.I. on Project M^3 in 1977. Spoke at the National Metric Conference and chaired a panel discussion at same conference in San Diego, California in 1980. Spoke and conducted a metric workshop at National Metric Conference in Miami, Florida, 1981. Conducted metric workshops at Rhode Island College and Boston College during the past three years.
Guest speaker on radio and published a series of newspaper articles on metrication.